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AND

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WITH WHICH IS INCORPORATED

The Year Book of Photography and Amateurs' Guide

1910.

EDITED BY GEORGE E. BROWN, F.I.C.

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PHOTOGRAPHIC SOCIETIES.

PHOTOGRAPHIC SOCIETIES OF THE UNITED KINGDOM.

The following list of British Photographic Societies has been compiled from data supplied by their respective Secretaries, except where so indicated In these instances no information has been recei ed up to the time of going to press.

* Societies marked with an asterisk are affiliated to the Royal Photographic Society

* The Royal Photographic Society of Great Britain.

FOUNDED 1853

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Meetings.—Held at 35, Russell Square, London, W C Weekly on Tuesday evenings, from November till June inclusive

Annual Exhibition.—September to October, at the New Gallery, 121, Regent Street, London, W

Secretary.—J McIntosh, 35, Russell Square, London

Aberdeen Photo. Art Club.—*Pres.*, G L Smith *Meetings*, 62, Fonthill Road, Alternate Fridays from October 1 *Sec*, John Rae, 19, St Nicholas Street, Aberdeen

Aberdeen Photographic Association—*Pres*, Alfred J Wood *Meetings*, 154, Union Street, Fridays, 8 p m *Sec*, Andrew Gray, 18, South Mount Street, Aberdeen

Accrington Camera Club.—*Pres*, Councillor John Clegg Lupton *Meetings*, Mechanics' Institute, Alternate Mondays, from October 4, 8 p m *Sec*, John Threlfall, 19, Monk Street, Accrington

Acton Photographic Society.—*Pres*, C B Green *Meetings*, Churchfield Hall, Second and Fourth Wednesdays, 8 p m *Sec*, A W Scott Cowan, "Annandale," Buxton Gardens, Acton, London W

Airdrie (Monklands), N.B. *Particulars not received from Secretary*

***Aldershot and District Camera Club.**—*Pres*, General Sir Geo Marshall, K C B *Meetings*, The Institute, Second and Fourth Tuesdays, October to May *Sec*, David Morrison, 80, St Michael's Road, Aldershot

Altrincham Photographic Society—*Pres*, T R Foxcroft *Meetings*, 7, Market Street, Alternate Tuesdays, from October 7 *Sec*, E J Middleton-Guimaraes, Standhills, Cavendish Road, Bowdon, Cheshire

Arbroath Amateur Photographic Society.—*Pres*, Geo G Dalgarno *Meetings*, Y M C A Rooms *Sec*, James Hood, 94, High Street

Architectural Association Camera and Sketching Club.—*Pres*, Alan Potter *Meetings*, 18, Tufton Street, Westminster Third Thursdays *Sec* A D Robinson, 18, Tufton Street, Westminster, London, S W

Armley and Wortley Photographic Society.—*Pres*, Dr T H Waddington *Meetings*, Station Road Mission Room, Armley Alternate Thursdays, from October 7 *Sec*, George E Craven, 1, Paisley View, Upper Armley, Leeds

Artists R.V. (20th Middlesex).—*Pres*, Colonel W Horsley *Meetings*, Duke's Road, Euston Road, Frequently during winter *Sec*, Henry W Fairholme, Blenheim Mansions, Queen Anne's Gate, London, S W

Ashton-under-Lyne Photographic Society.—*Pres*, John W Kenworthy *Meetings*, The Rooms, Henry Square, Fridays *Sec*, Wm Hallam, 43, Taunton Road, Ashton-under-Lyne

Aston Photographic Society.—*Pres*, Harold Baker *Meetings*, Burlington Hall, High Street, Thursdays, 8 p m *Sec*, F Greenway, 43, Douglas Road, Handsworth, Birmingham

Attercliffe Photographic Society.—*Pres*, L Havenhand *Meetings*, Friends' Meeting House, Leeds Road, Sheffield First and Third Mondays, 8 p m *Sec*, Herbert H Diver, 439, Middlewood Road, Sheffield

Ayr Amateur Photographic Society.—*Pres.*, Robert Adam *Meetings*, 48, High Street, Mondays, 8 p m *Ex.*, February. *Sec.*, Robert Weir, 21, Ardlui Road, Ayr, N B

***Balham Camera Club.**—*Pres.*, W W Aldridge *Meetings*, 141, Balham Hill, Wednesdays, 8 30 p m *Sec.*, F Beard, 4, Chetwode Road, Trinity Road, London, S W

Banbury and District Photographic Society.—*Meetings*, Municipal Technical School, First Mondays, 8 p m *Sec.*, Seymour H Beale, Caerleon, Banbury

Barrhead and District Amateur Art Club.—*Pres.*, R Murray, *Meetings*, Studio, Water Road, Wednesdays, 8 p m *Ex.*, April. *Sec.*, J McGrouther, Glenartney, Barrhead

Barrow Naturalists' Field Club (Photographic Section).—*Pres.*, W J Angus *Meetings*, Cambridge Hall, St George's Square, Tuesdays, 8 15 *Sec.*, James Frankland, 8, Greengate, Barrow-in-Furness

***Bath Photographic Society.**—*Pres.*, Rev Jas. Dunn, M A. *Meetings*, Royal Literary and Scientific Institution, alternate Mondays, from October 4 *Sec.*, W J Hallett, 10, Stall Street, Bath

Batley and District Photographic Society.—*Pres.*, Dr Broughton *Meetings*, Technical School, Thursdays, 8 p m *Sec.*, Charles Henry Giggal, 38, Wellington Street, Batley

***Bedford Camera Club.**—*Pres.*, R W L. Phillips *Meetings*, Association Buildings, Alternate Mondays, from October 3, 8 p m *Ex.*, March *Sec.*, Ernest F Buttfield, 95, Tavistock Street, Bedford

***Belfast City Y.M.C.A. Camera Club.**—*Pres.*, A G Cromie *Meetings*, Y M C A, Wellington Place, First Tuesdays *Sec.*, Hugh Crawford, Kinvara, Castle Park, Belfast

Belfast Queen's University Camera Club—*Pres.* John Wylie, B A *Meetings*, Students' Union, Queen's University, First Tuesdays *Sec.*, J D M M'Callum, Ardenwohr, Windsor Avenue, Belfast.

***Belmont Camera Club.**—*Pres.*, Charles Radburn *Meetings*, Sherwood House, York Road, Battersea, S W *Sec.*, P A Belcher, Belmont Works, Battersea, London, S W

Bideford Camera Club.—*Pres.*, J Whitlock *Meetings*, Bridge Chambers, Fridays, 8 p m. *Sec.*, J H Alford, 3, Trafalgar Place, Bideford.

***Birkenhead Photographic Association.**—*Pres.*, R J Russell *Meetings*, Y M C A, Grange Road, Fridays, 8 p m *Sec.*, J T Peters, 62, Westbourne Road, Birkenhead

***Birmingham Photographic Society.**—*Pres.*, Harold Holcroft, M A, F C S, F R P S *Meetings*, Exchange Buildings, New Street, Tuesdays, 7 30. *Ex.*, February *Sec.*, S Wortley, 10 Newhall Street, Birmingham.

Birmingham Field Naturalists' Club—*Pres*, A H Angus, B Sc *Meetings*, People's Hall, Tuesdays, 7 30 p m *Sec*, Herbert Thompson, 68, Castleford Road, Sparkhill, Birmingham

Birstall Photographic Society.—*Pres*, Albert Capstick *Meetings*, Parish Church Institute, Alternate Thursdays, from September 30 *Sec*, William Blakeley, Chemist, Market Place, Birstall, near Leeds

***Bishop Auckland Photographic Society.**—*Pres*, W Loftus Cummins *Meetings*, 11, Silver Street F x, November. *Sec*, Geo Ross, Cemetery Lodge, Bishop Auckland

Blackburn and District Camera Club.—*Pres*, Dr J. Barr, J P *Meetings*, 29, Church Street, Second Tuesdays *Sec*, W Ernest Balme, 95, Queen's Road, Blackburn

Blackburn Inter-Club Photographic Alliance.—*Pres*, W Baldwin *Meetings*, Shorrock Fold. *Sec*, Arthur Clayton, 10 Wycollar Road, Blackburn

Blackpool and Fylde Photographic Society.—*Pres*, John R Johnson *Meetings*, 1, Clifton Street, Tuesdays, September to April, 8 p m *Sec*, A F Wilson, 34, Woodland Grove, Blackpool

Blairgowrie and District Photographic Association.—*Pres*, Alexander Geikie *Meetings*, Club Rooms, George Street, Third Tuesdays (except during June, July, and August), 8 15 p m *Sec*, Lake Falconer, jun, The Alders, Rattray, Blairgowrie

Blaydon and District Camera Club.—*Particulars not received from Secretary*

Bletchingley and Nutfield Camera Club—*Pres*, Rev A H De Fontaine *Meetings*, Church House *Sec*, Jarvis Kenrick, Pendell House Bletchingley

Blyth and District Camera Club.—*Pres*, Lord Ridley *Meetings*, Wright Street, Cowpen Quay, Alternate Tuesdays, from October 19 *Sec*, W French, 20, Barnard Street, Blyth.

Bolton Camera Club.—*Pres*, W. M Balshaw *Meetings*, Corporation Chambers, Corporation Street, Thursdays, 8 p m *Sec*, H Lightouler, 26, Mackenzie Street, Astley Bridge, Bolton

Bolton Photographic Society.—*Sec*, C K. Dalton, 50, Higher Bridge Street, Bolton.

Bonnybridge Amateur Photographic Association.—*Particulars not received from Secretary*

Bootle, Johnson Bros. Photographic Society.—*Pres*, B S Johnson *Meetings*, Recreation grounds, first Mondays *Sec*, A. Currie, 6, Corona Road, Waterloo, Liverpool

Bootle Photographic Society.—*Pres*, Alderman W R Brewster, J P *Meetings* Central Public Library, Tuesdays, 8 p m *Sec*, W E Parry, 3, Church Street, Bootle, Lancs

***Borough Polytechnic Photographic Society.**—*Pres*, E H Roberts *Meetings*, 103, Borough Road, Wednesdays, 8 15 p m. *Sec.*, Alfred G Buckham, 103, Borough Road, London, S E

Boston Camera Club.—*Pres*, Dr C W Pilcher *Meetings*, St James's Schools, George Street, First and Third Tuesdays, October to April, 8 30 p m *Sec*, H M Hames, 65, West Street, Boston, Lincolnshire

Bournville and District Photographic Society.—*Pres*, George Shann, M A *Meetings*, Ruskin Hall, Mondays 8 p m *Sec*, A Harris, 96, Oak Tree Lane, Selly Oak, near Birmingham

***Bournville Camera Club.**—*Pres*, George Cadbury, jun *Meetings*, Bournville Works Social Club, Second and Fourth Thursdays, 7 p m *Sec*, J Oliver Wilkes, 308, Franklin Road, King's Norton, near Birmingham

***Bowes Park and District Photographic Society.**—*Pres*, E H Down *Meetings*, Unity Hall, Newnham Road, Wood Green, N, First and Third Mondays, 8 p m *Sec*, H Taylor Smith, 19, Meads Road, Westbury Avenue, Wood Green, London, N

Bradford Photographic Society *Pres*, A Bracewell *Meetings*, Arts Club, Mondays, 8 p m *Sec*, W E Townend, 14, Manchester Road, Bradford

Bradford Grammar School Photographic Society.—*Pres*, Rev W H Keeling, M A *Meetings*, Bradford Grammar School, Tuesdays, 7 30 p m *Sec*, Harold Atkinson, 275, Rock Terrace, Bradford

Braintree and Bocking Camera Club.—*Meetings*, The Institute *Sec* Edward Fenton, High Street, Braintree

Brechin Photographic Association. *Pres*, Wm Shaw Adamson *Meetings*, Mechanics' Institute Third Wednesdays, 8 15 p m *Sec*, D M Watt, 5, Union Street, Brechin, N B

***Brentford Photographic Society.**—*Particulars not received from Secretary*

Brighouse Photographic Society—*Pres*, Dr Geo A Farrer *Meetings*, Studio, Town Hall Buildings, Thursdays, 8 p m *Sec*, F W Crowther, Woodleigh, 15, Old Lane, Brighouse

***Bristol and West of England Amateur Photographic Association** *Pres*, Frank Richardson *Meetings*, 20, Berkeley Square, Clifton, Second and Fourth Fridays, October to April *Sec*, Guy Chilton, 34 Baldwin Street, Bristol

***Bristol Photographic Club.**—*Pres* John Fisher. *Meetings*, Stuckey's Restaurant, Wine Street Second and Fourth Wednesdays, 8 p m *Sec*, Thomas C Pearse, 38 Queen's Square, Bristol

***Bromley (Kent) Camera Club.**—*Pres*, T Scott, B A, M B *Meetings*, The Literary Institute, Widmore Road, First and Third Fridays, from October to April, 8 p m *Ex*, January *Sec*, Thos D Geaty, Collingtree, Cambridge Road, Bromley, Kent

Broomfield (Golcar) Photographic Society—*Pres*, Councillor Henry Wilkinson *Meetings*, Broomfield House, Golcar First Wednesdays *Sec*, Harold Rawcliffe, 24, Carr Lane, Slaithwaite, near Huddersfield

***Burnley Camera Club.**—*Pres* T Judson *Meetings*, Mechanics' Institution, Thursdays, 7 45 p m *Sec*, Charles B Anderson, Hood House Grove, Burnley

Burnley Co-operative Camera Club. - *Meetings*, Committee Room, Co-operative Society, Tuesdays *Sec*, J Spencer, 138, Cleaver Street, Burnley, Lancs

Burton-on-Trent Natural History and Archæological Society (Photographic Section). - *Particulars not received from Secretary*

Bury Athenæum Photographic Society.—*Pres*, Dr A P Nuttall *Meetings*, Athenæum, Market Street, Alternate Fridays, October to April *Sec*, J Nichols, 36, Nelson Street, Fishpool, Bury, Lancs

***Bury St. Edmund's Camera Club.**—*Pres*, J D Hunter *Meetings*, Masonic Hall *Sec* Owen A Clark, 12, Abbeygate Street, Bury St Edmund's

***Cambridge and District Photographic Club.** —*Pres*, W H Bansall. *Meetings*, Hobson's Place, Sidney Street, Second and Fourth Tuesdays, 8 30 p m *Ex*, November *Sec*, T J Sowdon, "Sunny Side," Guest Road, Cambridge

Canterbury Camera Club *Pres*, Dr R Graham Wills *Meetings*, Haywood's Restaurant, Alternate Mondays, from October 4, 8 30 p m *Sec*, G T Hobbis 3, Norman Road Canterbury

Cardiff City Y.M C A. Camera Club —*Particulars not received from Secretary*

***Cardiff Photographic Society** —*Particulars not received from Secretary*

Cardiff Windsor Photographic Society. - *Pres*, W Holloway *Meetings*, 6, High Street, Thursdays, 8 p m *Sec*, I Vaughan Evans, 149 Richmond Road, Cardiff

Carluke Photographic Association. - *Pres*, Richard Chalmers *Meetings*, Clyde Street, Second Mondays, 8 p m *Sec*, Andrew Fraser, Auchencairn, Home Street, Carluke

***Carlisle and County Amateur Photographic Society.** *Pres*, John Sewell *Meetings*, Tullie House, Wednesdays, 8 p m *Sec*, Samuel W B Jack, Grosvenor Studios, 19, Lowther Street, Carlisle

Carlisle Liberal Border City Camera Club.—*Pres*, F W Chance *Meetings*, Liberal Club, Lowther Street, First and Third Tuesdays, November to March *Sec*, John Robinson, 37, Warwick Road, Carlisle

Carnoustie Photographic Association.—*Pres*, D J Henderson. *Meetings*, Club Rooms, Terrace Road, Second and Fourth Mondays *Sec*, Harry Methven, Panmure Bank, Carnoustie

Caterham Camera Club —*Meetings*, Caterham Institute, Second and Fourth Mondays, 8 30 p m. *Sec*, J O. Scrivener, "Mistleigh," Caterham Valley

***Catford and Forest Hill Photographic Society.**—*Pres*, Major E F Coates, M P *Meetings*, Dartmouth Hall, Forest Hill, First and Third Mondays *Ex*, March *Sec*, William Theyer Browne, 169, Woolstone Road, Forest Hill, S E

Central Photographic Society. *Pres*, Dr J H. Wilson *Meetings*, Central Y M C A., 346, Strand, W C *Ex*, October *Sec*, John W Hubday, Central Y M C A, 346, Strand, London, W C

***Central Technical College Photographic Society.**—*Pres*, Prof O Henrici, F R S *Meetings*, Central Technical College, Wednesdays during winter *Sec*, E E Walker, 210, Bedford Hill, Balham, London, S W

Century Camera Club-*Pres.*, Professor Finlay *Sec*, J B Philip, 8, Belvidere Crescent, Aberdeen

***Chelmsford Photographic Society**—*Pres.*, The Mayor *Meetings*, School of Art, First and Third Thursdays 8 p m *Sec*, W J Morison, Sevenoake Lodge Chelmsford

***Chelsea and District Photographic Society.** *Pres*, F. Humpherson *Meetings*, South-Western Polytechnic, Manresa Road, Chelsea, Alternate Thursdays, from October 14 *Sec*, R C Gibbs, 169A, Fulham Road, London, S W

Cheltenham Amateur Photographic Society *Pres*, Sir E Templer Leeds, Bart *Meetings*, York House, St Luke's Road, Alternate Wednesdays from September 15, 8 p m *Sec*, Walter J Bache, "Eythorne," All Saints Road, Cheltenham

***Cheltenham College Photographic Society.**-*Pres*, C. E Youngman, M A *Meetings*, College Physics Lecture Room. *Sec.*, R M Towers, M A, 7, Oriel Place, Cheltenham

Cheltenham Salem Institute Camera Club *Pres*, E J Burrow *Meetings*, Salem Institute, Cheltenham, Last Thursdays *Sec*, J Ashton Mann, Southampton House, London Road, Cheltenham

***Chester Society of Natural Science, Literature, and Art (Photographic Section).**—*Pres*, J A McMichael, B A, B Sc *Meetings*, Grosvenor Museum, Third Fridays, 8 p m *Sec*, Frank Simpson, 10, Grosvenor Street, Chester

Chester Y.M C.A. Camera Club.—*Pres*, T C Johnson *Meetings*, Parr s Bank Chambers, First Thursdays. *Sec*, Albert E Matthews, 5, Parkgate Road, Chester

Chichester Photographic Society.—*Pres*, F B Tompkins, *Meetings*, Technical Institute, Second and Fourth Tuesdays, October to March, 8 15, Second Thursdays, April to September *Sec*, Ernest H Hooper, 26, South Street, Chichester

***Chislehurst Photographic Society.**—*Pres.*, Rev James Dawson, M A *Meetings*, Society's Rooms, Crown Lane, alternate Mondays October to May *Sec*, George W. Miller, White House, The Common, Chislehurst

***Chiswick Camera Club.**—*Pres*, C H Marriott *Meetings*, Devonshire Room, Town Hall, Second and Fourth Tuesdays at 8 15 *Sec*, William H Cook, 45, Boston Park Road, Brentford

Chorley Photographic Society.—*Pres*, Richard Gill *Meetings*, Library Street, Second Wednesdays, 7 30 p m *Sec*, John Rawlinson, 41, Hamilton Road, Chorley

City Guilds Technical College Photographic Society.—*Dead*

***City of London and Cripplegate Photographic Society.** *Pres*, Chairman of the Cripplegate Foundation *Meetings*, Cripplegate Institute, Second and Fourth Mondays, 7 30 p m *Ex*, February *Sec*, H S Cuming, 234, North End Road, West Kensington, London, W

Clapham Carlton Camera Club *Pres*, Major Frank Johnson *Meetings*, Clapham Carlton Club *Sec*, Herbert Tozer Preston House, Clapham Common, S W

Cleveland Camera Club *Pres*, J J Burton *Meetings* Literary and Philosophical Institution Corporation Road, Middlesbrough, Alternate Mondays from October 11, 7 30 p m *Sec*, Fred W Pearson, 39, Granville Road, Middlesbrough

***Coalville and District Photographic Society**—*Pres*, A H Harris *Meetings*, Adult School, Bridge Road, Third Thursdays 8 p m *Sec*, Owen W F Thomas, "Glencoe," London Road, Coalville

Coatbridge Co-operative Camera Club. *Pres*, William Lawson *Meetings*, Library Hall, alternate Mondays, from October 4 *Sec*, George P Frame, jun, 28, Portland Street, Coatbridge, N B

Coatbridge Naturalists' Association (Photographic Section).—*Pres*, S H Wood *Meetings*, Carnegie Library, First and Third Thursdays, October to April *Sec*, Geo Watson Campbell, Ailsa Cottage, Coatbridge

Coatbridge Photographic Association. *Pres*, S H Wood *Meetings*, Carnegie Library, Second and Fourth Thursdays from October 28 *Ex*, October *Sec*, William McAnsh, 216, Bank Street, Coatbridge

Colne Camera Club.—*Pres*, Joseph Hey *Meetings*, Cloth Hall Walton Street, Fridays *Sec*, Joseph H Kay, 167, Skipton Road, Colne, Lancs

Consett and District Photographic Society—*Pres*, E J George *Meetings*, Luton House, Middle Street, Wednesdays and Saturdays, 8 p m *Sec*, W E Massey, 28, Constance Street, Consett

***Cornish Camera Club**—*Pres*, R. Pearce Couch *Meetings*, The Studio, Penzance *Sec*, Henry Stewart, 6, Causewayhead, Penzance

Cornwall Royal Polytechnic Society.—*Pres*, John D Enys *Meetings*, Polytechnic Hall, Falmouth *Ex*, September *Sec*, E W Newton, 4, Cross Street, Camborne Cornwall

***Coventry Photographic Club.**—*Pres*, M. W Danks *Meetings*, 7, Little Park Street, Wednesdays *Ex*, March *Sec*, J B Stanley, 7, Little Park Street Coventry

***Cowes Camera Club.**—*Pres*, Rev R G Davis *Meetings*, Town Hall Second and Fourth Wednesdays, from October to March *Sec*, Edwin E Vincent, 4, High Street, Cowes, I W

Cowlairs Co-operative Camera Club. —*Pres*, Robert J. Habbick. *Meetings*, 264, Springburn Road, Glasgow, Second and Last Fridays *Ex*, March *Sec*, S J Moreland, 264, Springburn Road, Glasgow

Crompton Camera Club. *Pres*, James H Broadbelt *Meetings*, Club House, Collinge Street, Shaw, Wednesdays *Sec*, Henry Illingworth, Holmdene, Chamber Road, Shaw, Lancs

***Croydon Camera Club.** *Pres*, J M Sellors *Meetings*, 128A, George Street, Wednesdays, 8 p m *Sec*, W. H Claypole, B A, 63, Elmwood Road, West Croydon, Surrey

Culcheth Camera Club. *Pres*, M H Kenyon *Meetings*, Sunday Schoolroom, Newton Heath, Third Mondays *Sec*, Henry Barratt, 14, Hope Street, Newton Heath, Manchester

Darlington Camera Club. -*Pres*, H Pike Pease, J P *Meetings*, Temperance Institute, Alternate Tuesdays, from October 5 *Sec*, Charles J Barthorpe, Northgate, Darlington

Darwen Photographic Association. *Pres*, J W Smith *Meetings* Belgrave Schools, Wednesdays, 8 p m *Sec*, William Edge, 11, Cobden Street, Darwen, Lancs

Deal and Walmer Camera Club. -*Dead*

Dennistoun Amateur Photographic Association.- *Pres* Charles S Bathgate *Meetings*, 53, Roslea Drive, Wednesdays, 8 p m *Ex*, February *Sec*, A M Logan, Lesterie, Riddrie, Glasgow

***Derby Photographic Society.** -*Pres*, C J Gude *Meetings* Cumberland's Room, The Wardwick Second Mondays *Sec*, Norman Baker, The Hollies, Littleover, Derby

***Derby School Field Club** —*Pres*, Rev A C Knight *Meetings*, Derby School *Sec*, The Secretary, Derby School, Derby

Devonport Camera Club. - *Pres*, C Dietschey *Meetings*, Technical Schools, Second Tuesdays *Sec*, S F Heal, Holmleigh, Alma Road, Plymouth

Dewsbury Photographic Society. —*Pres*, Albert Lyles *Meetings*, Central Liberal Club Bond Street, Mondays, October to March inclusive, 8 p m *Sec*, Joseph Garside, 45, Heald's Road, Dewsbury

***Doncaster Camera Club.**—*Pres*, W Roberts *Meetings*, The "Albany" Second and Fourth Tuesdays from September 28, 8 15 p m *Ex*, November *Sec*, Fred A Jordan, 21, Baxter Gate, Doncaster

Dorking Camera Club *Pres*, Wm J Down *Meetings*, Literary Institute, First Thursdays, 12.15 p m, *Sec*, B F Piper, 72, High Street, Dorking.

***Dover Institute Photographic Society.** — *Pres*, E M Worsfold *Meetings*, Dover Institute, Second and Fourth Thursdays *Sec*, H E. Philpott, 6, Biggin Street, Dover

***Dover Sciences Society.** —*Pres*, Captain S G McDakin *Meetings*, "Arthur's Room," First and Third Tuesdays, 8 p m *Sec*, A W Gilham, Holmesdale, Priory Hill, Dover

Droylsden Co-operative Photographic Society.—*Pres*, N Hibbert *Meetings* Central Premises, Market Street, First and Third Thursdays, 8 p m *Sec*, J Fellows, 53, Montana Street Openshaw, Manchester

Dudley and District Camera Club.- *Pres*, Dr John Wishart, *Meetings*, Council Schools *Sec*, James Martin Sankey, Lorraine House, Dudley, Northumberland

Dukinfield Photographic Society.- *Pres*, S T Ainsworth *Meetings*, Co-operative Hall, Astley Street, Wednesdays, 8 30 *Sec*, Ernest Till, 30, Bass Street, Dukinfield

Dumbarton Equitable Co-operative Camera Club.— *Pres*, Wm Craig *Meetings*, 46, High Street, Alternate Tuesdays, 7 30 p m, from October 5 *Sec*, George Watson, 216, High Street, Dumbarton

***Dundee and East of Scotland Photographic Association.** *Pres*, J A Peebles —*Meetings* University College, First Thursdays, November to May (except January) *Sec*, V C Baird, Broughty Ferry

***Ealing Photographic Society** - *Pres*, J Watson, F R P S *Meetings*, Town Hall, First and Third Wednesdays, October to March *Sec*, T W Bartlett, 20, Craven Avenue, Ealing

Earlestown, Newton, and District Photographic Society.— *Pres*, George M McAinsh *Meetings*, Town Hall, Earlestown, Last Thursdays, 8 p m *Sec*, Ernest P Cleworth, 19, Cross Lane, Newton-le-Willows

***Eastbourne Natural History, Scientific and Literary Society (Photographic Section)** —*Pres*, J J Holloway *Meetings*, Technical Institute, Third Thursdays, October to May, 8 15 p m *Sec*, Albert J Fellows, 7, Susans Road, Eastbourne

***East Kent Scientific and Photographic Society.**—*Pres*, S Harvey, F I C, F C S *Meetings*, Beaney Institute, alternate Wednesdays, 8 p m *Sec*, A Lander, 17, High Street, Canterbury

***Edinburgh Photographic Society.** —*Pres*, J F Duthie, F R P S *Meetings*, 38, Castle Street, First, Second, and Fourth Wednesdays, October to June *Ex*, February *Sec*, J S McCulloch, W.S, 3A, North Saint David Street, Edinburgh.

Edinburgh Heriot Camera Club.—*Pres*, T A Clark *Meetings*, George Heriot's School *Sec*, D J R Cairns, 12, W Savile Terrace, Edinburgh

Edinburgh Photographic Club —*Pres*, J F Duthie. *Meetings*, 38, Castle Street, Third Wednesdays, 8 p.m *Sec*, T Barclay, 26, Blackford Avenue, Edinburgh

Edinburgh University Photographic Society.—*Particulars not received from Secretary*

***Epsom and District Literary and Scientific Society (Photographic Section)** —*Pres*, Dr E C Daniel. *Meetings*, Committee Room, Public Hall *Sec*, W J Pickering, Waterloo Road, Epsom

Erdington Photographic Society. —*Pres.*, G L Moore, *Meetings*, Drayton Studio, High Street, every Monday September to March, 8 p m, last Monday in month April to August *Sec*, Thomas A Sands, 26, Hillaries Road, Gravelly Hill, Birmingham

Everton Camera Club —*Pres*, J Colefield *Meetings*, 14, Village Street, Wednesdays, 8 p m *Sec*, J P Geo, 30, Douglas Road, Anfield, Liverpool

***Exeter Camera Club.**—*Pres*, T A Goard *Meetings*, Barnfield House Alternate Mondays, October to May *Sec*, J W Lake, 41, High Street, Exeter

***Fakenham Literary and Camera Club.** *Pres*, Algernon Digby, M A *Meetings*, Lecture Hall *Sec*, Henry Newson, The Square, Fakenham, Norfolk

***Folkestone and District Camera Club.**—*Pres.*, Alderman F Hall, J P *Meetings*, Technical Schools, First and Third Thursdays *Sec* Geo H Sheaff, Priory Dene, Julian Road, Folkestone

***Forest Gate Camera Club.** —*Pres*, Rev J H French *Meetings*, Richmond Hall, Romford Road, Tuesdays, 8 p m. *Sec.*, Edw J May, 6, Tylney Road, Forest Gate, London, E

Glasgow and West of Scotland Amateur Photographic Association —*Pres*, Victor L Alexander *Meetings*, 180, West Regent Street, First and Third Mondays *Ex*, February *Sec*, James McKissack, 68, West Regent Street, Glasgow

Glasgow Eastern Photographic Association —*Pres*, Thomas B Kirkhope *Meetings*, 12A, Landressy Street, Thursdays, 8 p m *Sec*, William Silvie, 48, Greenvale Street, Mile End, Glasgow,

Glasgow Southern Photographic Association. —*Pres.*, Robert Ure, B Sc *Meetings*, 169, Eglinton Street, Tuesdays, 8 p m *Ex*, March *Sec*, Robert Lindsay, 191, Allison Street, Govanhill, Glasgow

Glasgow St. George Co-operative Camera Club. —*Pres*, J Rennie *Meetings* 40, Gladstone Street, Glasgow, alternate Fridays, from October 1 *Ex*, December *Sec*, J Pettigrew, 8, Buchanan Street, Partick, Glasgow, W

Glenalmond Photographic Club.—*Pres*, Arthur S Reid, M A, F G S *Meetings*, Trinity College, Alternate Saturdays during College Terms *Sec*, A S Reid, Trinity College, Glenalmond, Perthshire

Glossop Dale Photographic Society.—*Pres*, J Merry *Meetings*, Metcalf's Rooms, High Street, First Tuesdays. *Sec*, T. W Sharpe, 85, Primrose Terrace, Glossop

***Gloucestershire Photographic Society.**—*Particulars not received from Secretary*

Godalming Photographic Society.—*Meetings*, Municipal Buildings, Last Thursdays, October to March, 8 15 p m *Sec*, S R Vorstage, Holloway Hill, Godalming

Grange Photographic Club.—*Pres*, John F Haws *Meetings* 27, Trafford Chambers, St John Street, Liverpool, Third Saturdays *Sec*, A E Wallis, 27, Trafford Chambers, St John St, Liverpool

Grange-over-Sands Literary and Scientific Society (Photographic Section)—*Pres*, G A Booth *Meetings* Victoria Room, Mondays, 7 30 p m *Sec*, Rev Geo Vicars Gaskell, Grange over-Sands

Grangemouth Amateur Photographic Association.—*Pres*, Joseph McGowan, M D *Meetings*, Lumley Street, Second Thursdays, 8 p m *Sec*, Robert Marshall, 3, Park Terrace, Grangemouth

***Grantham Photographic Society.** *Pres*, Thomas Stow *Meetings*, Museum, Guildhall First and Third Tuesdays *Sec*, J M Smith, 31, High Street, Grantham

Graphic Society, Plymouth.—*Pres*, G P Treleaven *Sec*, J S Hawker, Mutley House, Plymouth

Gravesend and District Photographic Society *Particulars not received from Secretary*

***Great Western Railway Literary Society (Photographic Section).**—*Pres*, Col the Hon C E Edgcumbe *Meetings*, 44, Eastbourne Terrace, Paddington, W, every Third Tuesday from October 5, 5 45 p m *Hon Sec*, C E Smith, 44, Eastbourne Terrace, Paddington, London, W

Greenock Camera Club—*Pres*, Colonel W U Park *Meetings*, Good Templar Hall, Thursdays, 8 p m, from September to April *Sec*, Robert MacNaught, 70, Union Street, Greenock

Grimsby and District Camera Club.—*Pres*, A H H witt *Meetings*, 160, Freeman Street, First Wednesdays *Secs*, W H Scrimshaw, 92, Lambert Road, Grimsby, and Alfred Still, 27, Pasture Street, Grimsby

***Guernsey Photographic Society**—*Pres*, Col T W M de Guerin *Meetings*, Guille-Allès Library First Mondays (winter months), 8 p m *Sec*, H C Le Messurier, Old Bank, Guernsey

Guild, (The) Leeds.—*Sec*, R Stockdale, 13, Mount Preston, Leeds

***Guildford Photographic Society.**—*Particulars not received from Secretary*

Guisborough Fine Art and Industrial Society—*Pres*, W Charlton, J.P *Meetings*, Mechanics' Institute *Sec*, George Page, 34, Westgate, Guisborough

Guiseley and District Photographic Society.—*Dead*

***Guy's Hospital Nurses' Photographic Society.**—*Pres*, Miss S A Swift *Meetings*, Nurses' Home, Guy's Hospital, Weekly. *Sec*, Miss M Smith, Guy's Hospital, S E

***Hackney Photographic Society.**—*Pres*, J Linley *Meetings*, Hackney Baths, Tuesdays, 8 p m *Ex*, November *Sec*, Walter Selfe, 24, Pembury Road, Clapton, London, N E

Halifax Camera Club.—*Pres*, J Ingham-Learoyd *Meetings*, 29, Northgate, Tuesdays, October to March inclusive *Sec*, Harry Crossley, 10, Surrey Street, Hopwood Lane, Halifax

Hamilton Photographic Society.—*Pres* James Ellis *Meetings*, Free Library *Sec*, William Frame Windmill Road, Hamilton

***Hampstead Scientific Society (Photographic Section).** *Meetings*, Stanfield House, Prince Arthur Road *Sec*, H. Nevil Smart, 40, Compayne Gardens, Hampstead, London N W

***Handsworth Photographic Society.**—*Pres*, Philip Whitehouse *Meetings*, 20, Soho Road, Thursdays 8 p m *Sec*, A E Teague, 67, Whitehall Road, Handsworth, Birmingham.

Hanley Y.M.C.A. Photographic Society.—*Pres*, S Harrison *Meetings*, Y M C A Rooms, Tuesdays, October to March, 7 30 p m *Secs*, J R Cox, 217, Cobridge Road, Hanley, and George T Boulton, 125, Gilman Street, Hanley

Harthill Camera Club.—*Pres*, Dr Millar *Meetings*, Studio, Bankhead, Alternate Wednesdays from September 15th *Sec*, William Martin, Victoria Place Harthill, Lanarkshire, N B

***Hartlepools Photographic Society.** *Pres*, F Yeoman, J P *Meetings*, Technical College, West Hartlepool, First and Third Wednesdays *Sec*, A S Foxall, 1, Elm Grove, West Hartlepool

***Hastings and St. Leonards Photographic Society.**—*Pres*, R White-Ford, J P *Meetings*, Public Hall, First Thursdays and Third Mondays, 8 15 p m *Sec*, J Turner, "Southlands," 57, Priory Avenue, Hastings

Havant Camera Club.—*Pres*, F Truvott *Meetings*, The Pavilion, Third Thursdays, *Ex*, October *Sec*, T J. Riley, 24, West Street, Havant, Hants

Heaton and District Camera Club (Newcastle-on-Tyne).—*Pres*, Samuel Orr *Meetings*, Byker Bridge Assembly Rooms First and Third Thursdays from October 7 *Sec*, George C Urwin, 24, Tenth Avenue, Newcastle-on Tyne

Hebden Bridge Photographic Society. *Pres*, J H Bamford, *Meetings*, Secondary School, Pitt Street, Second Tuesdays and Saturdays *Sec*, Robert Law, 29, Melbourne Street, Hebden Bridge

Herefordshire Photographic Society—*Pres*, Walter Pilley *Meetings*, 76, Eign Street *Sec*, Frank C Pritchard, High Town, Hereford

Horwich Mechanics' Institute Photographic Society.—*Pres*, George Hughes *Meetings*, Mechanic's Institute, First and Third Wednesdays, 7 30 p m *Ex*, March *Sec*, W Cunningham, 31, Penn Street, Horwich

***Hove Camera Club.**—*Pres*, A R Sargeant, J P *Meetings*, 9, Lansdowne Street, Second and Fourth Tuesdays 8 p m *Ex*, October. *Sec*, Stanley Read, 12, Old Steine, Brighton

Huddersfield Naturalist and Photographic Society.—*Pres*, Owen Avison *Meetings* Technical College, Alternate Wednesdays, from October 6 *Sec*, A C Ellis, "Braeside," Huddersfield

Hull Photographic Society.—*Pres*, Dr John Divine *Meetings*, Grey Street, Thursdays, 8 p m *Sec*, F J Webster, 96, Witham, Hull

***Ibis Camera Club.**—*Pres*, Sir Henry Harben *Meetings*, 142, Holborn Bars *Secs*, W H Coleman, Battlefield Road, St Albans, and H A Costello, 142, Holborn Bars, E C

Idlers' Camera Club. - *Pres*, Roderick J Fry *Meetings*, 45, Nevil Road, Bristol, last Saturdays *Sec*, George C D Mallott, 45, Nevil Road, Bristol

***Ilford Photographic Society.** *Pres*, F C Boyes *Meetings*, Cecil Hall, Wednesdays, 8 p m *Ex*, February *Sec*, T M Weaver, 69, Elgin Road, Seven Kings, Ilford, Essex

Ilkeston Arts Club - *Pres*, The Mayor *Meetings*, Free Library, First Fridays. *Ex*, April *Sec*, Arthur Smith, Cleeve Villa, Graham Street, Ilkeston

Ipswich Camera Club. --*Pres*, G H Hewetson *Secs*, R Dixey, Waterloo House, Ipswich, and S Haggar, 111, London Road, Ipswich

***Ipswich Scientific Society (Photographic Section).** -*Pres*, Frank Woolnough *Meetings*, The Museum, First Wednesdays, 8 p m *Sec*, H De Beer 93, London Road, Ipswich

***Ipswich Social Settlement Camera Club** *Pres*, Sir Daniel F Goddard, M P *Meetings* Social Settlement, Fore Street, alternate Mondays from January 3 *Sec*, Fredk G Mallott, "Montgomery," Bishops Hill, Ipswich

***Isle of Man Camera Club.**—*Pres*, W Beck *Meeting* 61, Buck's Road, Douglas, alternate Tuesdays, 8 p m *Sec*, T B Qualtrough, 76, Buck's Road, Douglas, Isle of Man

***Isle of Wight Photographic Society.** -*Pres*, Prof J Milne, F R S, D Sc *Meetings*, Literary Institute, Newport, First and Third Wednesdays October to March, First Wednesday April to September *Sec*, Harold Read, 80, The Mall, Newport, I W

Jarrow Mechanics' Institute Camera Club.--*Pres*, E W Penman *Meetings*, Mechanics' Institute, Alternate Thursdays, from October 14, 8 p m *Sec*, J D Wake, 35, Wansbeck Street, Jarrow-on-Tyne

Keighley Photographic Society.—*Pres*, Thos Mountain *Meetings*, Mechanics' Institute, Tuesdays *Sec*, Wilfrid Moore, "Hazelroyd," Keighley

Kennaway Photographic Society.—*Pres*, the Rev Prebendary H E Fox *Meetings*, 16, Salisbury Square, E C, Last Mondays *Sec*, W R C Cooke, C M House, 16, Salisbury Square, London, E C

Kettering Photographic Society.—*Pres*, J A Gotch, F S A *Meetings*, Church Institute, Second Thursdays, 8 p m. *Sec*, Ernest Claypole, 112, Hawthorn Road, Kettering

Kidderminster and District Photographic Society.—*Pres*, J Armytage Batley, M A *Meetings*, rear of 21, High Street, October to April, alternate Mondays, 8 p m, from October 11 Summer Session, Fourth Mondays *Sec*, H. W West, The Hollies, Birmingham Road, Kidderminster

King's Heath and Moseley Photographic Society.—*Particulars not received from Secretary*

King's Lynn Photographic Society.—*Pres*, S A Gurney. *Sec*, W E Daw, Hazeldene, Hunstanton

***Kingston-on-Thames and District Photographic Society.**—*Pres*, John F East, J P *Meetings*, Public Library, Mondays, October to March, 8 p m *Secs*, John F East, J P, Uxbridge House, Kingston-on-Thames, and A W Grant, Woodleigh, Crane's Park Avenue, Surbiton

***King William's College, Isle of Man, Photographic Society.**—*Pres*, J D Paul *Meetings*, Engineering Laboratory, King William's College *Sec*, Eric D Lasmey, King William's College, Isle of Man

Kinning Park Co-operative Camera Club.—*Pres*, George Peebles *Meetings*, Club Rooms, 6, Langlands Road, Govan, alternate Tuesdays, from January 4, 8 p m *Sec*, Hugh Topping, 20, Elizabeth Street, Ibrox N B

Kirkcaldy Photographic Society.—*Pres*, A B Young *Meetings*, 196, High Street, First Mondays *Ex*, March *Sec*, James M Harcus, 28, Townsend Place, Kirkcaldy

Lancaster Photographic Society—*Pres*, Thos Baines *Meetings*, Stonewell, Mondays and Fridays, 8 p m *Ex*, November *Sec*, R T Simpson, 60, North Road, Lancaster

Larkhall Camera Club.—*Pres*, Patrick Gallacher *Meetings*, Club Rooms, First and Third Fridays *Sec*, Robert Rodger, 37, Claude Street, Larkhall

Leeds Camera Club—*Pres*, R Bourke *Meetings*, Leeds Institute, Cookridge Street, Mondays, 8 p m *Sec*, F G Issott, 33, Dorset Terrace, Harehills Leeds

Leeds Photographic Society.—*Pres*, Thomas W Thornton *Meetings*, Leeds Institute, Cookridge Street, Tuesdays, 8 p m *Sec*, Robert Mackay, 69 Albion Street, Leeds

Leeds Central Technical School (Photographic Laboratory) *Meetings*, Central Technical School, Tuesdays and Thursdays, 7 15 p m *Sec*, James Graham, Education Offices, Leeds

Leek Photographic Society.—*Pres*, Victor Prince *Meetings*, Alexandra Club, Market Place, Mondays and Thursdays, 8 p m. *Sec*, H Mottershead, 41, St Edward Street, Leek

Leicester and Leicestershire Photographic Society.—*Pres*, A Bailey *Meetings*, Oriental Café, Market Place, Leicester, Wednesdays, 8 p m *Sec*, Chas Wm Leake, 24, Dulverton Road, Leicester

Leicester Literary and Philosophical Society (Section "G," Photography).—*Pres*, W Bell *Meetings*, Council Chamber, Town Museum, First Thursdays, October to April *Sec*, W Bailey, 6, Welford Road, Leicester

Leigh (Lancs.) Photographic Society.—*Pres*, T. Lee Syms, F R P S *Meetings*, over Co-operative premises, Railway Road, alternate Thursdays from October 7, 8 30 p m *Sec*, J W Markham, 59 Windermere Road, Leigh, Lancs

Leith Amateur Photographic Association.—*Pres*, Thos Wilson *Meetings*, 6, Charlotte Street, Last Tuesdays. *Sec*, Robert Knowles, 45, Pitt Street, Leith, N B

Lewes Photographic Society.—*Pres*, G J Wightman *Meetings*, Town Hall, Second Tuesdays, 8 p m *Sec*, F W Davey, Moat Cottage, St Michaels, Lewes

Lincoln Amateur Photographic Society.—*Pres*, J T Coleman *Meetings*, Guild Court, Danes Terrace, Fridays, 8 p m *Sec*, W Otter, 37, Ripon Street, Lincoln

Lindley Naturalist and Photographic Society. *Pres*, Charles Morley *Meetings*, Mechanics' Hall, Alternate Mondays from October 18, 8 p m *Sec* George Henry Kaye, 66, Rock Terrace, West Street, Lindley, near Huddersfield

***Liverpool Amateur Photographic Association.** *Pres*, J Dudley Johnston *Meetings*, 9, Eberle Street, Thursdays, 7 45 p m *Sec*, Chas F Inston, F R P S, 25, South John Street, Liverpool

Liverpool Central Y.M.C.A. Camera Club.—*Pres*, F O Creswell *Meetings*, Y M C A, Mount Pleasant *Sec*, J Graham, 26, Alfred Road, Birkenhead

***London and County Bank Photographic Club**—*Pres*, J J Cater *Meetings*, Sports Club, Norbury, Third Saturdays, October to April *Sec*, H G Hart, 21, Lombard Street, London, E C

***London and Provincial Photographic Association.**—*Trustees*, T E Freshwater, A Haddon *Meetings*, Apple Tree and Mitre, Cursitor Street, E C, Thursdays, 7 30 p m *Sec*, Ernest Human, 43, Whitta Road, Manor Park, Essex

***London County Council Camera Club.** - *Pres*, A H Ve..tage *Meetings*, County Hall, Spring Gardens, S W, Fourth Thursdays, 5 30 p m *Sec*, H Clutterbuck, County Hall, Spring Gardens, London, S W

Londonderry Camera Club.—*Pres*, Sir R Newman Chambers, Kt *Meetings*, 12, Strand Road, First Wednesdays *Sec*, R W Saville, 61, Beechwood Avenue, Londonderry

Longridge Camera Club.—*Pres*, Rev R Walker Berry *Meetings*, Chapel Street, Tuesdays *Sec*, J Robinson, College Villas, Longridge, near Preston

Longton and District Photographic Society.—*Pres*, Dr A Parkes, J P *Meetings*, Sutherland Institute, Second and Fourth Thursdays, September to April, 7 30 p m *Sec*, Thomas Mottershead, 32, Stafford Street Longton, Staffs

***Lyonsdown Amateur Photographic Society.**—*Particulars not received from Secretary*

Loughborough and District Photographic Society.—*Pres*, Walter C Burder, J P *Meetings*, The Club, Biggin Street, Fridays, 8 p m *Ex*, March. *Sec*, J E Underwood, Bedford Square, Loughborough

***Maidstone and Institute Camera Club.**—*Pres*, Rev A. Gatehouse *Meetings*, Church Institute, Second and Fourth Thursdays from September 30 *Sec*, J C Harris, 23, Knightrider Street, Maidstone

***Malvern Camera Club.**—*Pres*, Sir Henry Foley Grey, Bart. *Meetings* Camera Club, Priory Place, First and Third Mondays *Sec*, J Bate Nickolls, F C S, The Exchange, Malvern

***Manchester Amateur Photographic Society.**—*Pres*, Dr A T Lakin *Meetings*, Ducie Chambers, 57, Market Street Tuesdays, 6 p m *Sec*, George M Morris, 9, Chandos Road, Chorlton-cum-Hardy, Manchester

Manchester Camera Club. *Sec*, Charles Dawson, 34, Queen Street, Manchester

Manchester Photographic Society.—*Pres*, Thomas Chilton *Meetings*, Exeter Restaurant, Second Mondays, September to May 7 30 p m *Sec*, C H Coote, Holly Bank, Ashton-on-Mersey, Manchester

Manchester—Simpson Memorial Camera Club. *Pres*, Dr A T Lakin *Meetings*, Simpson Memorial, First and Third Fridays, 8 p m *Sec*, W H Eyas, Oak Bank, Blackley, Manchester

Manchester Y M.C.A Photographic Club.—*Pres*, H Burn *Meetings*, Y M C A, 56, Peter Street, First Fridays *Sec*, T Cox, 43, Monton Street, Moss Side, Manchester

Mansfield Camera Club. *Pres*, F W Ellis *Sec*, W O Pegg, 44, Westfield Lane, Mansfield

***Margate Photographic and Scientific Society.**—*Pres*, John Stokes *Meetings*, St John's House, Hawley Square, Wednesdays *Sec*, John Saxby, 23 Upper Approach Road, Margate

***Marylebone Camera Club.** *Pres*, Jordan Roche Lynch, junr *Meetings* Presbyterian Church, Upper George Street, Second and Fourth Mondays *Sec* E Markwell, 38, Upper George Street, Edgware Road, London, W

Melbourne Camera Club *Dead*

Mid-Cheshire Society of Art.—*Sec*, George Holland, 32, Moss Road, Northwich

Midlothian Photographic Association.—*Pres*, J B Johnston *Meetings*, 5, St Andrew Square, Edinburgh, First and Third Thursdays, October to May, 8 p m *Ex*, February *Sec*, G W Black, 123, George Street, Edinburgh

Mill Camera Club.—*Pres*, E H Joynson *Meetings*, The Laboratory, Joynson's Paper Mills, St Mary Cray, Fridays, 8 p m *Sec*, W C Swindon, River Cottage St Paul's Cray, Kent

Millfields Road (Clapton) L.C.C. School Photographic Society—*Dead*

Morley and District Photographic Society.—*Pres*, Dr S T Steele *Meetings*, Queen Street, First and Third Tuesdays *Sec*, Ernest B Bradley, Worrall Street, Morley, Yorks

Morpeth Y.M.C.A. Camera Club.—*Pres*, Alderman G B Bainbridge *Meetings*, Y M C A, Mondays, 7 30 p m *Ex*, April *Sec*, James Whittle, 30, Bridge Street Morpeth

Motherwell Young Men's Institute Camera Club. *Particulars not received from Secretary*

Muirkirk Amateur Photographic Association.—*Pres*, Rev James Greenshields, B D *Meetings*, Irondale, Tuesdays, 8 p m *Sec*, William Barrowman, Irondale, Muirkirk

Neath and District Photographic Society.—*Pres*, Herbert S Sutton *Meetings*, Y M C A Lecture Hall, Tuesdays, 8 p m *Sec*, George H Weekes, 5, Lewis Road, Neath

***Nelson Camera Club.**—*Pres*, Smith *Meetings*, Co-operative Buildings, Elizabeth Street, Tuesdays, 7 45 *Sec*, Fred Hartley, 4, Pickup Street, Nelson, Lancs

***Nelson Photographic Society.**—*Pres*, A E Normington, M B *Meetings*, Victoria Hall, Scotland Road, Tuesdays, 7 30 p m *Sec*, Henry H Beetham, 98, Brunswick Street, Nelson, Lancashire

New Mills and District Camera Club. *Pres*, Herbert Wyatt *Meetings*, 13 Union Road, Thursdays *Sec*, John Bradbury, Sunny Bank, Furness Vale, Stockport

Night Photographers, Society of. *Pres* A H Blake, M A *Sec*, Russell Burchall, L C C County Hall, Spring Gardens, London, S W

***Northampton Natural History Society and Field Club (Photographic Section).**—*Pres*, H Manfield, M P *Meetings*, 63, Abington Street *Sec*, C H Dorman, A R I B A, 53, Abington Street, Northampton

North London Photographic Society.—*Pres*, G Hale *Meetings*, 7, Highbury Place, Thursday, 8 15 p m *Ex*, February *Sec*, H E Jackson, 11, The Broadway, Highbury Park, London, N

***North Middlesex Photographic Society.**—*Pres*, H W Fincham *Meetings*, Hanley Hall, Sparsholt Road, Crouch Hill, Wednesdays, 8 15 p m *Sec*, Chas A Morgan 23, Nelson Road, Stroud Green, London, N

***North-West London Photographic Society.**—*Pres*, Walter Kilbey *Meetings*, Spencer Hall, 19, Dartmouth Park Hill, N W Second and Fourth Thursdays, October to May *Ex*, May *Sec*, Henry S Date, 34, Woodsome Road, Highgate Road, London, N W

***Norwich and District Photographic Society.**—*Pres*, A E Coe *Meetings*, Castle Museum and Municipal Secondary School, First and Third Mondays, 8 p m *Ex*, February *Sec*, J T Tanner, The Lodge, Bowthorpe Road, Norwich

***Nottingham Camera Club**—*Pres*, Arthur Marshall, F R P S *Meetings*, Mechanics' Institution, Thursdays, 8 p m *Ex*, March *Sec*, E A. Pollard, 4, Hedley Villas Beach Avenue, Nottingham.

Oldham Equitable Photographic Society.—*Pres*, Wm Mann *Meetings*, Equitable Co operative Society, Greenwood Street, Mondays, 7 30 p m *Sec*, Chas Ledger, 6 Airey Street, Oldham

Oldham Lyceum Photographic Society—*Pres*, T R Marsden, J P *Meetings*, The Lyceum, Tuesdays, 8 p m *Sec*, Edward Hearne, 99, Manchester Street, Oldham, Lancs

Oldham Photographic Society.—*Pres*, Joseph Dixon *Meetings*, Trust Buildings, Manchester Street, Thursdays, 8 p m *Sec*, Harold Embleton, 20, Greengate Street, Oldham

Oliver Goldsmith Photographic Society.—*Pres*, A H Butterworth *Meetings*, Collyer Hall Schools, High Street, Peckham, S E, Third Fridays April to September, First and Third Fridays October to March *Sec*, H F Edmeads, 77, Ansdell Road, Peckham, London, S E

Otley and District Camera and Art Society.—*Pres*, Fairfax Fearnley *Meetings*, 3, Wesley Street, Tuesdays (October to March), 7 45 p m *Sec*, J W Stancliffe, 36, Market Place, Otley

Outer Hebrides Photographic Society.—*Pres*, Archibald A Chisholm *Meetings*, Lochmaddy *Sec*, Archibald A Chisholm, Lochmaddy, Scotland

***Oxford Camera Club.**—*Pres*, Sir W J Herschel, Bart *Meetings*, The University Museum, Second and Fourth Mondays, October to April *Secs*, Miss Venables, 26, Norham Gardens, Oxford, and Miss Aitchison, 104, Banbury Road, Oxford

Padiham Photographic Society.—*Pres*, E Garner *Meetings*, Technical School, Alternate Tuesdays, from October 5 *Sec*, J Hoole, 1, Moor Lane, Padiham

Paisley Philosophical Institution (Photographic Section)—* *Pres*, Dr Andrew Richmond *Meetings*, 28, Oakshaw Street, Fridays *Ex*, February *Sec*, S Bernard Wade, 11, Buchanan Terrace, Paisley, N B

***Peterborough Photographic Society**—*Pres*, George Kirkwood, M D *Meetings*, Church Institute, Fortnightly *Sec*, T J Calcutt, 46, Narrow Street

***Photographic Club.**—*Meetings*, Red Cross Hotel, Paternoster Square, E C, Wednesdays, 8 p m *Sec*, A Corbett, 2, Orchard Street, Portman Square, London W

***Photographic Society of Ireland.**—*Pres*, Robert Benson *Meetings*, 35, Molesworth Street, Dublin, First and Third Fridays, 8 p m *Sec*, D H Leonard, 24, Cabra Park Dublin

***Plymouth Photographic Society.**—*Pres*, Norton M Carey *Meetings*, The Athenæum, Alternate Fridays, 8 p m *Sec*, C F. Ford, 149, Union Street, Plymouth

***Polytechnic Photographic Society.**—*Pres*, Howard Farmer *Meetings*, 309, Regent Street, Thursdays, 8 p m *Sec*, W Howard Musson, 309, Regent Street, London, W

***Portsmouth Camera Club**—*Pres*, A B Casey *Meetings*, 5, Pembroke Road, Wednesdays, October to March, 8 30 p m *Ex*, October *Sec*, James C Thompson, 23 Elm Grove, Southsea

Preston Camera Club.—*Pres.*, J Toulmin *Meetings*, Stanley Chambers, Lancaster Road, Mondays and Thursdays, 8 p m. *Secs*, Charles Mantell, Claremont, Powis Road, Preston, and J. B Beardsworth, Fairmount, Cadley, Preston

***Preston Scientific Society (Photographic Section).**—*Particulars not received from Secretary*

Preston (Lune Street), Brotherhood Camera Club—*Pres.*, Rev John Wilson, B A *Meetings*, Vestry behind Lecture Hall, Fox Street, Wednesdays, 7 30 *Sec.*, C E Peel, Chapel Lane, Longton, near Preston

Preston Pictorial Photographic Society. *Pres.*, G A Booth *Meetings*, 137, Friargate, Fridays *Sec.*, A W Cooper, 137, Friargate, Preston

Queen's Park Amateur Photographic Association.—*Pres.*, James McKissack *Meeting*, 43, Bankhall Street, Govanhill, Third Thursdays, 7 30 p m *Sec.*, John Moir, 318, Allison Street, Govanhill, Glasgow

***Ramsgate Photographic Society** *Pres.*, Leonard G Hodgson *Meetings*, St George's Men's Club, Alternate Mondays from October 11 *Sec.*, T B White, 12, Harbour Street, Ramsgate

Reading Liberal Club Photographic Society. *Particulars not received from Secretary*

Redcar and Cotham Literary Institute Photographic Society.—*Particulars not received from Secretary*

***Redhill and District Camera Club** *Pres.*, E E Robinson *Meetings*, 24, Station Road, Second and Fourth Mondays *Ex.* November *Sec.*, C Robinson, Broadfield, Reigate

***Richmond Camera Club.**—*Pres.*, F P Cembrano *Meetings*, Castle Assembly Rooms, Thursdays, 8 30 p m, October to April *Sec.*, J Sargent, 80, Sheen Park, Richmond, Surrey

Rochdale Amateur Photographic Society.—*Pres.*, J Renshaw *Meetings*, 244A, Yorkshire Street, Wednesdays, 7 45 p m *Ex.*, November *Sec.*, A F Cooper, 36 Infirmary Drive, Rochdale

Rodley, Farsley, Calverley and Bramley District Photographic Society—*Pres.* Walter Trickett *Meetings*, alternately at Rodley, Farsley, Calverley, and Bramley, Alternate Thursdays, 8 p m *Sec.*, H Crossley, Rodley, near Leeds

Romsey Photographic Society. —*Dead*

***Rotherham Photographic Society.**—*Pres.*, C H Moss *Meetings*, Society's Room, Frederick Street, First and Third Tuesdays, 8 p m *Ex.*, October *Sec.*, Henry C Hemingway, Tooker Road, Rotherham

Royal Cornwall Polytechnic Society. *Particulars not received from Secretary*

***Rugby Photographic Society.**—*Pres.*, B B Dickinson, M A *Meetings*, Physical Lecture Room, Rugby School, Alternate Thursdays, October to April 8 p m *Sec.*, R H Myers, 13, Bridget Street, Rugby

Ryde Photographic Society.—*Pres.*, M Maybrick *Meetings*, Church Lane, First and Third Tuesdays, 8 30 p m *Sec.*, Hugh Edgton, Pier Street, Ryde, Isle of Wight

St. Albans Camera Club.—*Pres*, W S Green *Meetings*, County Museum, Hatfield Road, Third Tuesdays, 8 15 p m *Secs*, Rev. J Aldred, Berrystead, St Albans, and Dr Puddicombe, 19, London Road, St Albans

St. Helens Camera Club.—*Pres*, H Warhom *Meetings*, 32, Church Street, Tuesdays, 8 p m *Sec*, John Glover, 14, Ormskirk Street, St Helens

St. Rollox Co-operative Camera Club.—*Particulars not received from Secretary*

Sale Photographic Society.—*Pres*, E Johnson *Meetings*, Temperance Institute, Wednesdays, 8 p m *Sec*, J Pilkington, 137, Marsland Road, Brooklands, Sale

Salisbury Camera Club. *Pres* Ambrose Tucker *Meetings*, School of Art *Ex*, March. *Sec*, H S Painter, "Altdorf," Bouverie Avenue, Salisbury

Scarborough and District Photographic Society. *Pres*, E L Davis *Meetings*, Museum, Mondays, 8 p m, November to March *Sec*, B A Kenny 30, Aberdeen Walk, Scarborough

Shaw Church Institute Photographic and Art Society.—*Pres*, J R Healow *Meetings*, Shaw Church Institute, First Fridays *Sec*, John Maiden, 93, Rochdale Road, Shaw, near Oldham, Lancs

***Sheffield Photographic Society.**—*Pres*, J W Wright *Meetings*, Builders' Exchange, Cross Burgess Street, First and Third Tuesdays, 7 30 p m *Ex*, April *Sec*, H Merrill, 22, Harboard Road, Norton Woodseats, Sheffield

***Sheffield and Hallamshire Photographic Society.**—*Pres*, C D Rose *Meetings*, Foresters' Hall Trippett Lane, Sheffield, Second Wednesdays, 8 p m *Sec*, Fred Lowe, 41, Carrington Road, Sheffield

Sheffield Friends' Photographic Society.—*Pres*, F R Pickering *Meetings*, Friends' Schools, Hartshead, First and Third Wednesdays, 8 p m *Sec*, John Varley, 238, Staniforth Road, Attercliffe

Shettleston and District Camera Club. *Pres*, J Wands *Meetings*, 367, Westmuir Street, Parkhead, Second Mondays, 8 p m *Sec*, Adam D Wilson, 399, Wellshot Rd, Tollcross, Glasgow

Shotts Camera Club. *Pres*, A W Hill, J P *Meetings*, Strathfillan Place, First Mondays October to April *Sec*, Bert L Forrest, Calderside House, Shotts, N B

Shropshire Camera Club.—*Pres* Right Hon the Earl of Plymouth *Meetings*, Castle Chambers, Castle Street, Shrewsbury, First Tuesdays, 7 30 p m *Sec*, W. O Wilding, 33, Castle Street, Shrewsbury

***Sidcup Camera Club.**—*Pres*, B Davidson *Meetings*, Public Hall, Second and Fourth Tuesdays *Sec*, H E Ladbury, 7, Clarence Road, Sidcup

Skipton Photographic Society—*Pres*, James Dodgson *Meetings*, Science and Art Schools, Mondays and Fridays *Sec* Percy Smith 3, Brougham Street, Skipton

Small Heath Photographic Society.—*Pres*, Chas F Hayward *Meetings*, Council Schools, Somerville Road, Alternate Thursdays from October 7 *Sec*, Alfred Roffey 586, Coventry Road, Birmingham

***Slough Photographic Society.**—*Particulars not received from Secretary*

Southall-Norwood Camera Club.—*Pres*, J. Hughes *Meetings*, Public Library, Southall, Second and Fourth Tuesdays, 8 p m *Sec*, W McWilliam, 2 Portland Road, Southall, Middlesex

***Southampton Camera Club.**—*Pres*, W Burrough-Hill *Meetings*, Philharmonic Hall, all Mondays from September to March inclusive, and the other six months alternate Mondays *Ex*, November *Sec*. S G Kimber, F R P S, "Oakdene," Highfield, Southampton

South Devon Teachers' Camera Club.—*Pres*, A W Searley *Meetings*, First Saturdays *Sec*, Charles Mole, Broadhempston, Totnes

***Southend-on-Sea Photographic Society.**—*Pres*, The Mayor *Meetings*, Technical School, First and Third Thursdays, October to May *Ex*, March *Sec*, John Archer, 24, Ashburnham Road, Southend on-Sea

***South Essex Camera Club.**—*Pres*, T H B Scott *Meetings*, Wakefield Hall, East Ham, Second and Fourth Wednesdays, 8 p m *Sec*, Thomas Michell, 180, Browning Road, Manor Park, E

***South London Photographic Society.** *Pres*, F J Mortimer, F R P S *Meetings*, South London Art Gallery, Peckham Mondays, 8 p m *Ex*, March *Sec*, H C Beckett, 44, Edith Road, Peckham, London, S E

South Manchester Photographic Society.—*Particulars not received from Secretary*

South Norwood Photographic Society.—*Pres*, John Smith *Meetings*, Public Hall, Station Road, Thursdays, 8 p m *Sec*, George Richard Beckett, 52, Denmark Road, South Norwood

Southport Photographic Society.—*Pres*, John McLellan *Meetings*, 9, Corporation Street, Mondays, 8 p m *Ex*, December *Sec*, Albert E Sharples, Dinorwie Road, Birkdale, Southport

South Shields Photographic Society.—*Dead*

***South Suburban Photographic Society.**—*Pres*, F J Mortimer, F R P S *Meetings*, Plough Hall, High Street, Lewisham Wednesdays, 8 p m *Sec*, John Nixon, Rydal, Ingleside Grove, Blackheath

Spen Valley Photographic Society.—*Pres*, T Brearley *Meetings*, The Museum, Liversedge, First Wednesdays *Sec*, John T Whittall, Mona Cottage, Cleckheaton

Stafford Photographic Society.—*Pres*, George Thorneycroft *Meetings*, Weiss and Fowke's Studio, Victoria Road, First and Third Mondays, October to May *Sec.*, Herbert A E Hey, Tillington, Stafford

***Staines and District Photographic Society.**—*Pres*, John Ashby, J P *Meetings*, Congregational Schoolroom, First and Third Tuesdays, 8 p m *Ex*, January *Sec*, F W Memory, "The Cot," Staines

Stockport Photographic Society.—*Pres*, C H. Carrington. *Meetings*, Mechanics' Institute, Second and Fourth Wednesdays, 8 p m *Sec*, Allen Bann, 120, Chatham Street, Stockport

Stoke-on-Trent Photographic Society.—*Pres*, Rev H V. Stuart *Meetings*, Church Institute, Alternate Wednesdays from September 15 *Sec*, J Henry Roe, 14, Edward Street, Stoke-on-Trent

Stone and District Photographic Society.—*Pres*, W Meakin. *Meetings*, Congregational Schools, Last Wednesdays *Sec*, R D Hotherington, 15, Arthur Street, Stone, Staffs

***Stratford G.E.R. Mechanics' Institution (Photographic Section)**—*Pres*, S D Holden, F R P S *Meetings*, G E R Mechanics' Institution, Store Street, Wednesdays, October to April, 8 p m *Ex*, March *Sec*, A Woolford, 16, Grove Green Road, Leytonstone, N E

Streatham Photographic Portfolio (and Society).—*Meetings*, 300, Streatham High Road, Last Fridays, 8 p m *Sec*, Frank E Huson, 56, Salford Road, Streatham Hill, London, S W

***Sunderland Photographic Association.**—*Pres*, Wm Milburn *Meetings*, Subscription Library, Alternate Thursdays from October 14, 8 p m *Sec* Wm E Kiefler, Stirling Street, Sunderland

Sutton and District Photographic Society—*Pres*, Alfred Clough *Meetings*, Sutton Mill Institute *Sec* George F Bland, Bridge Road, Sutton Mill, West Keighley Yorks

***Sutton Photographic Club.**—*Pres*, C. Thwaites *Meetings*, Public Hall Chambers, Fridays, from October to April, 8 30 p m *Sec*, Vivian Jobling, Wolferton, Gordon Road, Carshalton, Surrey

Swadlincote and District Photographic Society. *Pres*, G S Bragge *Meetings*, Baptist Parlour, First and Third Thursdays *Sec*, G T Forster, High Street, Woodville, nr Burton-on-Trent

***Swansea Camera Club.**—*Pres*, Paul Courtois *Meetings*, 14, Temple Street, Mondays, 8 p m *Sec*, R D Burnie, 14, Temple Street, Swansea

Tamworth and District Photographic Society.—*Pres*, Horace C Goostry *Meetings*, 15, Market Street, First and Third Tuesdays *Sec*, John W Parker, 17, Heath Street, Tamworth

***Thornton Heath Photographic Society.**—*Pres*, R A MacKenzie *Meetings*, Members' houses *Sec*, Geo W Stacy Bush, 10, Melfort Avenue, Thornton Heath, Surrey

Todmorden Photographic Society.—*Pres*, William Ormerod, J P *Meetings*, Ridge Lane, First Mondays *Sec*, John A. Kershaw, 30, Hare Hill Street, Todmorden.

***Tollington Park Old Tollingtonians Society (Photographic Section).**—*Pres*, E A Butler, B Sc *Meetings*, Tollington Schools, Muswell Hill and Tollington Park *Sec*, Robert Fouracre, 89, Tollington Park, London, N

***Torbay Camera Society.**—*Pres*, Colonel W Fothergill Macmullen *Meetings*, First Wednesdays, 3 30 p m *Sec*, Dr. Harley Gough, Glenallon, Torquay.

Tring Camera Club.—*Dead*

***Tunbridge Wells Amateur Photographic Association.**—*Pres*, Francis G Smart, M A, J P *Meetings*, Club Room, Dudley Institute, Dudley Road, First Thursdays and Third Wednesdays *Sec*, H Wild, Berrycroft, Warwick Park, Tunbridge Wells

Tynemouth (Borough of) Photographic Society. —*Pres*, James Barr *Meetings*, Presbyterian Hall, North Shields, Alternate Thursdays from October 7 *Sec*, Joseph R Johnston, 29, Drummond Terrace, North Shields

Tyneside Geographical Camera Club. -*Pres*, J G Smith *Meetings*, Geographical Institute, First Wednesdays, 7 30 p m *Sec*, John Scott, 10, Mosley Street, Newcastle-upon-Tyne

Uddingston Amateur Camera Club. —*Pres*, James Rowat *Meetings*, 44, Old Mill Road, Fridays *Ex*, February *Sec*, G A Robin, 4, Kyle Park, Uddingston, N B.

***Ulster Photographic Society** *Pres*, S W Allworthy, M A *Meetings*, 36, Garfield Chambers, Belfast, First and Third Mondays, September to May *Sec*, David James Hogg, 3, Trinity Street, Belfast

***Waddon Camera Club.** - *Pres* *Ps*, J Whelps and W W Topley *Meetings*, Offices of Croydon Gas Company *Sec*, Frank F Wood, 11, Milton Road Wallington

Wakefield Photographic Society. — *Pres*, J H Chaplin *Meetings*, Church Institute, 8 p m *Ex*, March *Sec*, George W Johnson, Newton Hill Wakefield

Walkley (Sheffield) Conservative Club Camera and Optical Lantern Society. -*Pres*, S Hall-Downing *Meetings*, Club Rooms, 147, Howard Road, Sheffield, First Thursdays *Sec*, S Hall-Downing, 288, South Road, Sheffield.

Wallasey Amateur Photographic Society.—*Pres*, Robert Tunnecliffe *Meetings*, 110, Brighton Street, Seacombe, Alternate Mondays from January 10 *Sec*, William Hayes, 110, Brighton Street, Seacombe.

***Wallington Camera Club.**—*Pres*, The Rector of Beddington *Meetings*, Sterndale Rooms, Fourth Tuesdays, September to May *Sec*, John A Lash, London & South-Western Bank, Wallington, Surrey

Walsall Photographic Society.—*Pres*, E J Shaw J P *Meetings* 5, Arcade Balcony, Bradford Street, Mondays, 8 p m *Sec* W T Comer, 4 and 6, Arcade, Walsall

***Walthamstow Photographic Society.** - *Pres*, E. Clarke, F R G S *Meetings*, The Hall, Vestry Road, First and Third Mondays, 8 p m *Sec*, Thomas R Nunn, 29, The Drive, Walthamstow, Essex

Walton (Liverpool) Photographic Society.—*Pres*, H Nicholls *Meetings*, Walton Church Schools, Second Wednesdays, 8 p m *Sec*, T Bickerstaff, 79, Rawcliffe Road, Walton, Liverpool

Warrington Photographic Society.—*Pres*, W E Brown, B A *Meetings*, Old Academy, Wednesdays, October to April. *Sec*, A C Smithson, Rush Green, Lymm

***Watford Camera Club.**—*Pres*, The Lord Hyde *Meetings*, 100, High Street, Thursdays, 8 30 p m *Ex*, October *Sec*, W J. Edmonds, 3, The Parade, Watford

***Watford Photographic Society.**—*Pres*, Lady Ebury *Meetings*, Public Library, Alternate Fridays from October 8. *Sec*, H. Langford Lewis, 78, Gladstone Road, Watford.

Wath and District Photographic Society.—*Particulars not received from Secretary*

***Wearside Camera Club.**—*Pres*, B B Mewburn *Meetings*, Fawcett Street Cafe, Sunderland, First and Third Tuesdays *Sec*, Bert Jackson, 12, Holmeside, Sunderland

***Wellcome Photographic Club** *Pres*, H S Wellcome *Meetings*, Wellcome Club and Institute, Dartford *Sec*, Frank C Starnes, Wellcome Club and Institute, Dartford, Kent

Wembley and Sudbury Camera Club —*Pres*, J H Churchill *Meetings*, St John's Schoolroom, Wembley, Alternate Thursdays from October 3, 8 p m *Sec*, Miss Woodroffe, Layfield, Sudbury, Middlesex

Wesley Guild Camera Club. *Pres*, Geo Blackledge *Meetings*, Wesley School, Abbey Street, Accrington *Sec* W E Ellis, 36, Beech Street, Accrington

***West Bromwich Photographic Society.**-*Particulars not received from Secretary*

West Calder Camera Club *Pres* Robert Calder *Meetings*, Masonic Hall, Alternate Tuesdays, from October 5, 7 45 p m *Sec*, Lawrence Girdwood, 27, Hermand, West Calder

Westhoughton Amateur Photographic Society.—*Particulars not received from Secretary*

***West London Photographic Society.** - *Dead*

***West Surrey Photographic Society.**- *Pres*, Dr H Pelham Webb *Meetings*, The Railway Hotel, 110, Battersea Rise, S W, Wednesdays *Sec*, Charle A Clear, 10, Grandison Road, Clapham Common, S W

***Weybridge and District Photographic Society.**- *Pres*, J Lyle *Meetings*, Parish Room, Alternate Thursdays from October 7 *Sec*, C J Garratt, Bank House Weybridge

***Weymouth Photographic Literary and Natural Science Club.**--*Pres*, A G Alletsee *Meetings*, Mondays, 8 p m *Sec*, John C Talbot, Exmouth House, Weymouth

Whitby Camera Club. *Pres*, J M Botham *Meetings*, Council Schools, Cliff Street, Fridays *Sec*, Woodhouse Parkinson, Ocean Road, West Cliff, Whitby

Whitley District Camera Club. -*Pres*, Dr J M Lazenby *Meetings*, Assembly Rooms, First and Third Tuesdays, 8 p m *Sec*, A B Roxburgh, 21, Grafton Road, Whitley Bay

Widnes Photographic Society. *Particulars not received from Secretary*

***Willesden Polytechnic Photographic Society.**--*Pres*, W B Luke, J P *Meetings*, Polytechnic, Priory Park Road, Kilburn Second, Third, and Fourth Mondays, 8 p m *Sec*, William Axten, Ravenscourt, Ealing Road, Wembley

***Wimbledon and District Camera Club.**- *Pres*, Peter Keary *Meetings*, 6, The Broadway, Second and Last Thursdays September to May *Sec*, Herbert Brigden, 12, Montague Road, Wimbledon, London, S W

***Wimbledon Park Photographic Society.** — *Pres*, Dr D Kernohan *Meetings*, 19, Replingham Road, Southfields, S W., Wednesdays, 8 15 p m *Sec*, W Cheeseman, 460, Merton Road, Wandsworth, London, S W

***Windsor Camera Club.**—*Pres*, Lord Edward Spencer Churchill *Meetings*, Royal Albert Institute *Sec*, Thomas J Cartland, Thames Side, Windsor

Wishaw Photographic Association.—*Pres*, William Calderhead M A, B Sc *Meetings*, Stanley Place, Young Street *Ex*, December-January *Sec*, R Telfer, 138, Glasgow Road, Wishaw

Wolverhampton Photographic Society.—*Pres*, F. Walton *Meetings*, Library, Waterloo Road First Mondays and Third Wednesdays *Sec*, Dr Turton, 6, Bath Road, Wolverhampton

***Woodford Photographic Society.**—*Meetings*, Wilfrid Lawson Hotel, First, Second, and Third Wednesdays, October to April *Sec*, F G Emler, Muiton Villa, Chelmsford Road, Woodford

***Woolwich Photographic Society.**—*Pres*, Charles Churchill, F R P S *Meetings*, Old Town Hall, William Street, First and Third Thursdays, October to April inclusive *Ex*, March *Sec*, S A Saffron, 19, Winchester Street, Silvertown, London, E

Worcestershire Camera Club and Photographic Survey Society. *Pres*, Rt Hon Earl Beauchamp, K C M G *Meetings*, 14, High Street, Wednesdays, 8 p m *Ex*, March *Sec*, Geo Harry Haycox, 25, St Wulstan's Crescent, Worcester

Workington Photographic Society.—*Pres*, W L Fletcher *Meetings*, Liberal Club, Second and Fourth Mondays, October to April *Sec*, John R Taylor, 15, Station Road, Workington

***Worthing Camera Club.**—*Pres*, W Ayton Gostling, M D *Meetings*, Club Rooms, 11, Liverpool Terrace, Tuesdays, November to April, 8 15 p m *Ex*, March *Sec*, Edmund F H Crouch, 11, South Street, Worthing

Yarmouth (Great) and District Camera Club. — *Pres*, Dr Beach *Meetings*, 156, King Street, Second and Fourth Wednesdays *Sec*, J Shearman, 156, King Street, Great Yarmouth

York St. Peter's School Natural History and Photographic Society.—*Pres*, Rev R Oborne Walker *Meetings*, Museum, St Peter's School, York, Saturdays (in term time), 6 p m.

POSTAL CLUBS.

Amateur Postal Camera Club (The).—*Sec*, W L G Bennett, Kingswear, South Devon

Anglo-Celtic Postal Photographic Society.—*Dead*

Architectural Postal Photographic Club.—*Sec*, J E Underwood, Bedford Square, Loughborough

Argosy Postal Photographic Club.—*Sec*, Rev C F Lowry Barnwell, Stramshall Vicarage, Uttoxeter, Staffs

Boy's Own Postal Photographic Club.—*Sec*, J E Hardwich, 14, Azalea Terrace South, Sunderland

Camera & Co. Postal Club.—*Sec*, H Wild, "Berrycroft, Blatchington Road, Warwick Park, Tunbridge Wells

Great Effort (The).—*Sec*, Cyril Burrage, "Egton," Beaconsfield Bucks.

Hand Camera Postal Club.—*Sec*, George V Myatt, "Sunningdale," West Worthing

Harpur Stereoscopic Postal Union.—*Sec*, G A Gearey, 33, Brereton Road, Bedford

Lantern Slide Exchange Club.—*Sec* J S Hawker, Mutley House, Plymouth

Light and Truth Postal Photographic Club—*Sec*, George Harry Haycox, St Wulstan's Crescent, Worcester

National Postal Photographic Society—*Sec* Frank Gardner, 32, Popple Street, Sheffield

Perseverance Postal Camera Club.—*Sec*, Mrs F L Carslake, Daracombe, Newton Abbot

Postal Camera Club—*Sec*, J C Warburg, 21, Pembridge Gardens, London, W

Postal Photographic Club.—*Sec*, Reginald A R Bennett, M A, Walton Manor Lodge, Oxford

Postal Pictorial Photography Club—*Sec*, Mrs Mary C Cottam, Burleigh Street, Clements Road, Bournemouth

Postal Salon.—*Sec.*, R Stockdale, 13, Mount Preston, Leeds

Quarterly Photographic Portfolio.—*Sec*, Leonard Gray "Castle, Dain tree," Norman Road Sutton, Surrey

Ripon Portfolio Club—*Sec* H Bulmer Rudd 29, Westgate, Ripon

Secretaries' Postal Photographic Society.—A circulating folio exclusively for hon secs or permanent officials of photographic societies containing prints, and dealing with general matters relating to photography, and the working of societies, clubs, etc *Hon Sec*, S G Kimber, F R P S, Oakdene, Highfield, Southampton

Somerset Postal Photographic Society. For advanced workers *Sec*, Bernard J Mitchell, 3 Willow Vale, Frome, Somerset

Stereoscopic Society (The)—*Sec*, B Ibster, B A, Huntly, N B

Sun and Company Postal Club. *Sec*, Martin J Harding, Oakdene Church Stretton

Talbot Album Club.—*Sec*, F H Langdon-Davies, Rutland Place, Boyne Hill, Maidenhead

United Stereoscopic Society (The). *Sec* Albert J Snow, 74, Lloyd Row, Walthamstow, London, E

Universal Correspondence Camera Club *Sec*, S Rubery, jun, 49, Lonsdale Road Wolverhampton

Wessex Photographic Postal Club. *Dead*

Zodiac Camera Club—*Hon Sec*, Miss Agnes B Warburg, 8, Porchester Terrace, London, W

Zoological Photographic Club.—*Sec*, Jasper Atkinson, Glen Esk, Alma Road, Headingley, Leeds

COLONIAL PHOTOGRAPHIC SOCIETIES.

Adelaide Camera Club.—*Pres*, P H Williams *Meetings*, Y M C A, Gawler Place, Adelaide, First Thursdays, 8 p m *Sec*, P Topperwien Commonwealth Audit Office, G P O, Adelaide, South Australia

Auckland Camera Club.—*Pres*, E W Payton *Meetings*, Club Room, 39, Victoria Street, Second Monday in month. *Sec*, A. Graham, 43, George Street, Auckland.

Auckland Y.M.C.A. Camera Club.—*Pres*, T F Hill *Meetings*, Y M C A., First Wednesdays, 7 45 p m *Sec*, Fredk E Cory, Y M C A, Auckland, N Z

Australian School of Photographers.—*Pres*, F A Campbell *Meetings*, Working Men's College, Bowen Street, Melbourne, First Mondays *Sec*, W R Huntsman, Addlestone House, 72, McArthur Place, Carlton, Melbourne, Australia

Ballarat Camera Club.—*Pres*, John Gazzard *Meetings*, Ballarat School of Mines, Second Wednesdays *Sec.*, George H Hutson, 226, Raglan Street, Ballarat, Victoria, Australia

Ballarat Photographic Club.—*Pres*, Prof A Mica Smith *Meetings*, School of Mines, Wednesdays in each month *Sec*, Fred J Mantell, Ballarat School of Mines, Ballarat, Victoria

Bathurst Amateur Camera Club.—*Pres*, E T Webb *Meetings*, Second Thursday each month *Sec*, H J Baldwin, Bathurst, New South Wales

Beechworth Camera Club.—*Pres*, C Hembrow *Meetings*, Public Library, Beechworth, Victoria, Second Thursday in each month, 8 p m *Sec*, R W Dover

Bendigo Amateur Photographic Association.—*Pres*, J G Austin *Meetings*, School of Mines, every alternate Thursday, 8 p m *Ex*, June *Sec*, Jas. Miller, Bath Corner, Bendigo, Victoria

Bombay Photographic Society—*Pres* Prof T K Gajjar, M A B Sc, F C S *Meetings*, The Techno-Chemical Laboratory, Girgaum, Bombay *Secs*, Bomanji Dorabji Padamji and Vasanji I Dalal, M A, B Sc, Techno Chemical Laboratory, Girgaum, Bombay

Boulder Technical School Camera Club—*Pres*, J F Lynch *Meeting* Technical School, Mondays, 8 p m *Sec*, F A Davis, Technical School, Boulder City, West Australia

Burnett Camera Club—*Pres*, George Henry Finch *Meetings*, School of Arts, Bundaberg, Third Tuesdays, 8 p m *Sec*, Horace John Page, Fargo Street, Bundaberg, Queensland, Australia

Cairns Amateur Photographic Society—*Pres*, R G Catt *Meetings*, School of Arts, 2nd Thursdays, 8 p m *Sec*, Arthur F Hunt, Cairns, Queensland, Australia

***Cape Town Photographic Society.**—*Pres*, J D Cartwright, M L A *Meetings* Old Town House Greenmarket Square, First Thursdays *Sec*, H Mudie Thomson, P O Box 896, Cape Town

Cape Town Camera Club—*Pres*, Walter Johnson *Meetings*, 10 Church Street, Alternate Fridays, 8 p m *Sec*, W Askew-Way, P O Box 802, Cape Town

Castlemaine Amateur Camera Club—*Pres*, H McBean *Meetings*, School of Mines, Castlemaine, Alternate Wednesdays *Sec*, C A Northcote, Market Square, Castlemaine, Victoria

Ceylon Amateur Photographic Society.—*Pres*, J H de Saram, C M G *Meetings*, Ferguson Memorial Hall, Last Fridays *Ex*, August *Sec*, Andreas Nell, L M S, M R C S, The Victoria Memorial Eye Hospital, Colombo

***Christchurch Photographic Society.**—*Pres*, W H Clark. *Meetings*, 154, Worcester Street, First Tuesdays *Sec*, E Harding, c/o Wallace and Co, High Street, Christchurch, N Z.

Clifton Hill Amateur Photographic Club.—*Pres.*, W P. Anderson *Meetings*, 330, Queen's Parade, North Fitzroy, Second Mondays *Sec*, F Dutton, 120, Fenwick Street, Clifton Hill, Melbourne, Australia

Cowra (N S.W.) School of Arts Amateur Photographic Society.—*Pres*, S Stevenson *Meetings*, Cowra School of Arts, Third Tuesday of each month *Sec*, John P McPhee, Kendal Street, Cowra, New South Wales

• **Dai-Nippon Shashin Kyokwi (Photographic Association of Japan).**—*Pres*, H E Viscount M Nagaska *Meetings*, Kwazoku-Kwaikan, 1, Uchiyamashitacho, Tokyo *Sec*, K Ogura 77, Minami-Enokimachi, Ushigome, Tokyo

Dunedin Photographic Society.—*Pres*, Donald Reid *Meetings*, South British Insurance Buildings, Liverpool Street, Second Thursdays, 8 p m *Sec*, Miss C H Mackenzie c/o London Photo Depot, Princes Street, Dunedin, N Z

East Malvern Amateur Photographic Club *Pres*, Rev J B Gason *Meetings*, St John's Schoolroom East Malvern, Second Fridays, 8 p m *Sec*, Arthur H Smith, Kilburn, 18, Wattle-tree Road, Malvern, Victoria

Etonia Camera Club.—*Pres*, R T Eaton *Meetings*, Rest Room, The T Eaton Co Limited Stores *Sec*, Eugene L Beaupré, c/o City Advertising Department, The T Eaton Co, Limited, Toronto, Canada

Gawler Photographic Society *Pres*, H L Marsh *Meetings*, Alternate Tuesdays from January 4 *Sec*, Arthur A Johnson, King Street, Gawler, South Australia

Gordon College Amateur Photographic Association—*Pres*, Thos Lord *Meetings*, Gordon College, Fenwick Street, Geelong, Wednesdays *Sec*, Horace L S Potter 97, Wellor Street, Geelong, Victoria, Australia.

Greytown Camera Club—*Pres* Rev Canon G E Pennington *Meetings*, Club Room, Comin's Buildings, Alternate Thursdays. *Ex*, March *Sec*, Frank Carter, P O Box 28, Greytown, Natal

Gulgong Amateur Photographic Society.—*Pres*, Archdeacon Geer *Meetings*, Club Room, every alternate Tuesday *Sec*, A P Lambert, Public School, Gulgong, New South Wales

Hamilton Association Camera Club, Canada. *Pres*, J M Eastwood *Meetings* Hamilton Association Rooms, Public Library *Sec*, W Henry Edwards, 168, Main Street, E, Hamilton, Ontario, Canada

Hawke's Bay Camera Club—*Pres*, F W Williams *Meetings*, Napier, N Z *Sec*, T Bruce Bear, c/o Napier Gas Co, Ltd, Napier, N Z

Ipswich (Queensland) Amateur Photographic Society.—*Pres*, R Henderson Johnston. *Meetings*, Hughes and Cameron's Buildings, last Tuesdays, 8 p m *Ex*, May *Sec*, Pearson W Cameron Nicholas Street, Ipswich, Queensland, Australia

Johannesburg Photographic Art Circle.—*Meetings*, Cuthbert's Buildings, First Tuesdays *Ex*, November *Sec*, Harold Smith, 71, Cuthbert's Buildings, Johannesburg

Kapunda Photographic Club.—*Pres.*, J E A Klose *Meetings*, School of Mines, alternate Tuesdays, 7 30 p m *Ex.*, September *Sec.*, Thos Warner, Chapple Street, Kapunda, South Australia

King William's Town Photographic Society.—*Pres.*, Rev Jas Pollock *Meetings*, Club Rooms, Museum Buildings *Sec.*, Henry D Beck, P O Box 103, King William's Town, South Africa

Lismore Camera Club.—*Pres.*, C St. H Syer *Meetings*, Studio, Molesworth Street, First Fridays *Sec.*, Stanley I Simmons, Lismore, New South Wales

Manawatu Camera Club, Palmerston North, N.Z.—*Pres.*, J H Perrin *Meetings*, Pratt's Hairdressing Saloon, Alternate Wednesdays *Sec.*, B Pratt, The Square, Palmerston North, N Z

***Maritzburg Camera Club.**—*Pres.*, D M Eadie *Meetings*, Hardy's Chambers, First Wednesday and Third Thursday *Sec.*, A R Hopkins, 4, Hardy's Chambers, Printing Office Street, Pietermaritzburg, Natal

Melbourne Working Men's College Photographic Club.—*Pres.*, F A Campbell *Meetings*, College Lecture Hall, Latrobe Street, Melbourne, Alternate Tuesdays, from May 4, at 8 p m *Sec.*, Albert V Bishop, 9, St George's Road, Malvern, Victoria, Australia

Montreal Amateur Athletic Association Camera Club—*Pres.*, C Power Cleghorn *Meeting*, 250, Peel Street *Sec.*, P S Robinson, 260, St James Street, Montreal, Canada

Mosman Photographic Society.—*Pres.* D M Mitchell *Meetings*, Raglan Street, Second Thursdays, 8 p m *Ex.*, September *Sec.*, A S Farmer, "Overmorton," Avenue Road, Mosman, Sydney, N S W

Mount Gambier Photographic Club.—*Pres.*, P C Kook *Meetings*, Chess Room, Institute, First Thursdays *Ex.*, February, *Sec.*, Edwin Kluge, Mount Gambier, South Australia

Mt Morgan Camera Club.—*Pres.*, D Baldwin *Meetings*, School of Arts First Saturdays, 7 30 p m *Sec.*, J C A Terris, Jeannie Street, Mt Morgan, Queensland

Nelson Camera Club.—*Pres.*, C Y Fell *Meetings*, Hardy Street, Second Tuesday in each month, 7 30 p m *Ex.*, October *Sec.*, H A Hobbs, Hardy Street, Nelson, New Zealand

Newcastle and District Camera Society—*Pres.*, J T Williams *Meetings*, 43, Hunter Street, Alternate Tuesdays *Sec.*, Montague W Cramp, Fleming Street, Islington, Newcastle, New South Wales

New South Wales Tramway Camera Club.—*Pres.*, Thomas Marsh *Meetings*, Tram Depot, Rushcutters Bay, Last Tuesdays, 8 p m *Sec.*, H E Perfect, "Hazeldean," Waratah Street, Enfield, Sydney, New South Wales, Australia

Northern Suburbs Camera Club, New South Wales.—*Pres.*, W A. Gullick *Meetings*, Pymble Club Hall Third Monday in each month, 8 p m *Sec.*, N McIntosh

***Northern Tasmanian Camera Club.**—*Pres.*, R Lewis Parker *Meetings*, Club Rooms, Launceston, Third Wednesdays, 8 p m *Sec.*, F Styant-Browne, 112, Brisbane Street, Launceston, Tasmania.

Oriental Photographic Association.—*Sec*, Kenzaburo Ando, 2-25 Kayacho, Shitaya ku, Tokio, Japan

Ottawa Photographic Art Club.—*Pres*, G E Saunders, Ph D. *Meetings*, Second Mondays October to May *Sec* William Ide B A 447 Riverdale Avenue, Ottawa

Paeroa Amateur Camera Club—*Pres*, E W Porritt *Meetings*, Club Rooms, Second Mondays 7 30 p m *Sec*, John Hubbard, Paeroa, Auckland, New Zealand

Perak Amateur Photographic Society.—*Pres*, L Wray, M I E E, F Z S *Meetings*, Poverty Flat, Museum Road, Taiping *Sec*, Geo. Bain, Taiping, Perak

Photographic Association of Canada *Pres*, J Frank Jackson *Sec*, Fred L Roy, Peterborough, Ontario, Canada

Photographic Employees' Association of New South Wales.—*Pres*, J C Cruden *Meetings*, Queen's Hall, Pitt Street, Sydney, Third Monday in each month *Sec*, Walter Davies, 58, Cavendish Street, Petersham, Sydney, N S W

***Photographic Society of India**—*Pres*, Dr T F Pearse, M D, D Ph *Meetings*, 40, Chowringhee, Second Mondays *Fr*, January *Sec*, A J Oliver, 40, Chowringhee, Calcutta

***Photographic Society of New South Wales.** *Pres*, J S Stening *Meetings*, 9, Hamilton Street Sydney, First and Third Tuesdays, 8 p m *Sec*, L L Raymond, Box 829, G P O, Sydney, N S W Australia

Port Elizabeth Amateur Photographic Society *Pres*, Wm Mieck *Meetings*, The Athenaeum, First and Last Tuesdays, 8 p m *Fr*, July *Sec* B F Everitt, Cape Road, Port Elizabeth

***Queensland Photographic Society.**—*Pres*, W C Voller *Meetings*, Technical College, Ann Street, Brisbane First and Second Thursdays *Sec*, E Colclough Department of Public Lands, Brisbane, Queensland

Rockhampton Camera Club.—*Pres*, W S A Hunter *Meetings*, Club Room, Alma Street First Thursdays *Sec*, A. T Nelson, c/o P A. Nelson and Co, Alma Street, Rockhampton, Queensland.

St. John Camera Club, Canada.—*Meetings*, 65, William Street, St John, New Brunswick *Sec* J Kaye Allison, P O, Box 401, St John, N B, Canada

Semaphore Photographic Society *Pres* W G Rendall *Meetings*, Esplanade First Mondays, 7 45 p m *Sec*, Charles W Mart, c/o Dalgety & Co, Ltd, St Vincent Street, Port Adelaide, South Australia

***South Australian Photographic Society**—*Pres* Charles Radcliffe *Meetings*, Institute, North Terrace, Adelaide, Second Thursdays, 8 p m *Sec*, A H Kingsborough, 51, Rundle Street, Adelaide, South Australia

Southern Tasmanian Camera Club.—*Pres*, A G Webster Peterson's Chambers Macquarie Street, Hobart *Meetings*, Second Tuesdays, 8 p m *Sec*, Alfred Propsting, 105, Elizabeth Street, Hobart

Stratford (N Z) Camera Club.—*Pres*, A W Reid *Meetings*, A Newton's Studio, Broadway, First Tuesdays, 7 30 p.m *Sec*, Walter J Newton, Swansea Road, Stratford, New Zealand

Toronto Camera Club.—*Pres.*, Alfred Robinson. *Meetings*, 2, Gould Street, Mondays, October to April *Sec.*, Hugh Neilson, 2, Gould Street, Toronto Ontario, Canada

Toronto Canoe Club Camera Club.—*Pres.*, H H Fullerton *Meetings*, Club House Third Tuesdays *Sec.*, T F Livingstone, 60 Richmond Street East, Toronto, Canada

Toronto School of Science Camera Club. *Pres.*, J E Kepps *Meetings*, Engineering Building, University of Toronto Alternate Thursdays from October 15 *Ex.*, March *Sec.*, C R McCollum, University of Toronto, Engineering Buildings, Toronto, Ontario, Canada

Toronto Y. M C. A (Central) Camera Club *Pres.*, Charles Boles *Meetings* Y M C A Building 415, Yonge Street, Second Tuesdays *Sec.* Harry Russell, 292, Yonge Street, Toronto

Upper Canada College Camera Club. *Meetings*, Upper Canada College, Toronto, Ontario *Sec.*, C M Biggar, 249, Simcoe Street, Toronto, Ontario, Canada

***Victoria Amateur Photographic Association**—*Pres.*, F A Kennot *Meetings*, Association Rooms, 57, Swanston Street, Melbourne, Second, Third, and Fourth Wednesdays *Sec.*, D W Paterson, 57, Swanston Street, Melbourne

Victorian Ladies' Photographic Society. *Pres.*, Miss Agnes Thomson *Meetings*, Working Men's College, Photographic Lecture Room, Bowen Street, Melbourne Second Tuesdays *Sec.* Miss Lucy Archibald, 1, Pollington Street, St Kilda, Victoria, Australia

***Wanganui Camera Club**—*Pres.*, C W Babbage *Meetings* Club Room, Ridgeway Street *Sec.*, G Bolton, Bank, New South Wales, Wanganui, New Zealand

***Wellington Camera Club.** *Pres.*, A de B Brandon *Meetings*, Exchange Buildings, Lambton Quay, Second Thursday in each month *Sec.*, J A Higginbotham, Wellington, New Zealand

Wellington College Camera Club *Pres.*, A C Gifford, M A *Meetings*, Wellington College, Wellington, N Z, Mondays during term *Sec.*, G G Watson, Wellington College, Wellington, N Z

West Australian Photographic Society (Perth).—*Meetings*, Third Wednesday in each month *Sec.*, A P L Wright, Public Works Department, Perth, West Australia

Winnipeg Camera Club.—*Pres.*, J G Norris *Meetings*, 273 Portage Avenue, Third Tuesdays *Ex.*, July *Sec.*, Jas M Iredale, 7, Hample Building, Portage Avenue, Winnipeg, Manitoba

AMERICAN SOCIETIES

The inclusion of a list of Photographic Societies in the United States is discontinued, as the space in the text portion of the "Almanac" is appropriated by information of more general interest Since only a small proportion of the readers of the "Almanac" are in a position to make any use of this American directory, the Editor believes he is consulting the wishes of the majority in omitting it from the present and future editions The directory of American societies last appeared in the "Almanac" for 1905

PHOTOGRAPHIC BODIES.

Under the following heading are arranged particulars of the chief photographic associations which cannot be appropriately included in the list of photographic societies

THE PROFESSIONAL PHOTOGRAPHERS' ASSOCIATION

In Affiliation with the Chambre Syndicale de la Photographie et de ses Applications, of Paris

The Association was founded in March, 1901, for the purpose of promoting the interests of professional photography, the assistance of its members in their business dealings, and rendering them advice and assistance when in legal or other difficulties

All professional photographers in business for themselves, or as managers of firms or companies, are entitled to membership

The subscription is 5s. per annum

Members' meetings are held on the second Fridays in October and January The annual general meeting is held on the second Friday in March The meetings are held at the Royal Photographic Society, 35, Russell Square, W C

The committee generally meets the second Thursday in each month, except July and August

Members are entitled to transfer existing fire policies to a first rate office at premiums 20 per cent less than they are paying Special arrangements have been made for insuring members liability under the Workmen's Compensation Act

The Association publishes a handbook annually containing much valuable information concerning copyright and other laws which particularly affect photographers The P P A Circular, published at intervals, in addition to information concerning the work of the Association, also contains much useful information upon matters of interest and importance to professional photographers

OFFICERS ETC.

PRESIDENT -Lang Sims

EX-PRESIDENT —H A Chapman, J P

MEMBERS OF COMMITTEE

London	Country
Bridge, F A	Birtles, T (Warrington)
Chase, H Gordon	Comley, Henry J (Stroud)
Ellis, Alfred	Gill, Wm (Colchester)
Elliott, Ernest C	Hawkings, W H (Plymouth)
Fry, S Herbert	Illingworth W (Northampton)
Hull, H Edmonds	Lankester, P (Tunbridge Wells)
Langfier, L	Moffat, F P (Edinburgh)
Mackie, Alexander	Protheroe, L R (Bristol)
Scamell, Edgar	Robinson, R W (Redhill)
Skillman, C H.	Spink, H C (Brighton)
Speaight, R N	Turner, T C (Hull)
Willson, R Fellows	Warrington, W (Liverpool)

HON SECRETARY —A. Mackie, 89, Albany Street, N W

HON TREASURER —Lang Sims, 437, Brixton Road, London, S W

HON SOLICITOR —P E Marshall, 35, Bedford Row, London, W C.

AUDITORS.—Frank Turner and C. St. J. Vaughan.

PROFESSIONAL PHOTOGRAPHERS' SOCIETY OF NEW YORK

PRESIDENT—Harry A. Bliss.
SECRETARY—Howard D. Beach, 469, Virginia Street, Buffalo, New York.

PHOTOGRAPHIC CONVENTION OF THE UNITED KINGDOM

The Twenty-fifth Annual Meeting will be held at Scarborough, July, 1910, under the presidency of Godfrey Bingley. Retiring President—H. Snowden Ward, F.R.P.S.

The Photographic Convention was founded in 1886 for the advancement of Photography and to afford opportunities for personal intercourse and exchange of ideas amongst those interested in the Art, from all parts of the United Kingdom.

Meetings have been held at the following Centres:—1886, Derby; 1887, Glasgow; 1888, Birmingham; 1889, London; 1890, Chester; 1891, Bath; 1892, Edinburgh; 1893, Plymouth; 1894, Dublin; 1895, Shrewsbury; 1896, Leeds; 1897, Great Yarmouth; 1898, Glasgow (second visit); 1899, Gloucester; 1900, Newcastle-on-Tyne; 1901, Oxford; 1902, Cambridge; 1903, Perth; 1904, Derby (second visit); 1905, Dublin (second visit); 1906, Southampton; 1907, Hereford; 1908, Brussels; 1909, Canterbury.

PAST PRESIDENTS.—J. Traill Taylor, Andrew Pringle, C. H. Bothamley, George Davison, William Bedford, George Mason, Sir Howard Grubb, A. Haddon, H. P. Robinson, F. P. Cembrano, John Stuart, William Crooke, Thomas Bedding, Sir William Herschel, Bart., Sir Robert S. Ball, Sir Robert Pullar, G. Herbert Strutt, Dr. John Joly, E. J. Humphery, Alfred Watkins, Sir Cecil Hertslet, H. Snowden Ward.

The Council of the Convention is empowered to make grants in aid of photographic research.

MEMBERS OF COUNCIL.

G. W. Atkins (Elstree).
A. C. Baldwin (London).
Harold Baker (Birmingham).
J. H. Baldock (Croydon).
R. R. Beard (London).
Godfrey Bingley (Leeds).
G. E. Brown (London).
F. B. Cattley (Harrogate).
H. J. Comley (Stroud).
A. H. De'Ath (Ashford).
F. Martin Duncan (London).
W. E. Dunmore (London).
Alfred Ellis (London).
Dr. A. R. F. Evershed (London).
S. H. Fry (London).
T. K. Grant (London).
F. W. Hindley (London).
Sydney Keith (Hounslow).
S. G. Kimber (Southampton).
C. Phipps Lucas (London).
F. J. Mortimer (London).
Walter F. Potter (London).
Ralph Robinson (Redhill).
P. R. Salmon (London).
F. H. Sanderson (Cambridge).
T. Scotton (Derby).
A. Seaman (Chesterfield).
H. M. Smith (London).
W. H. Smith (Purley).
Henry Spink (Brighton).
Jas. Taylor (Leeds).
F. B. Tompkins (Chichester).
T. C. Turner (Hull).
J. H. Walker (Leeds).
G. W. Watson (London).
J. B. B. Wellington (Elstree).
Courtenay Wells (Gloucester).
A. Werner (Dublin).
C. Winter (London).
S. H. Wratten (Croydon).

Messrs W T Carless (of Hereford) and M Vanderkindere (of Brussels) are, by Rule XII, *Ex Officio* members of Council for one and two years respectively.

Trustees —Major-General J Waterhouse, I A, Frederick Albert Bridge

Hon General Secretary and Treasurer F A Bridge, East Lodge, Dalston Lane, London, N E

THE ARTISTIC COPYRIGHT SOCIETY

President *Sir Lawrence Alma-Tadema O M, R A

Acting Vice-President —*Frank Dicksee, R A

General Committee — *George W Agnew M P (Chairman) Lockett Agnew, *Edwin Bale, R I, Frank Bishop, H Scott Bridgwater, Thomas Brock, R A, Walter Dowdeswell, Sir Luke Fildes, R A, O Gutekunst, A H Haig, R E, G C Haité, R I, Marshall* Hall K C, E B Haynes, Marcus B Huish, Seymour Lucas, R A, J MacWhirter R A, Sir W Orchardson, R A Joseph B Pratt, T E Scrutton, K C, *W Reynolds Stephens, Alexander Tooth, and Adolph Tuck

Solicitor -Herbert Voysey

Honorary Treasurer C Morland Agnew

Honorary Secretary *D Croal Thomson 120, Pall Mall

This Society has announced as its first activity "the endeavour to push through Parliament a Copyright Bill, such as will be acceptable to its members and beneficial to the community at large"

Extracts from the Rules

That the Society is formed with the object of promoting the interests of all concerned in artistic copyright

That the attention of the Society shall be specially directed to the improvement, amendment, and codification of the laws relating to Artistic Copyright in the United Kingdom, and to the promotion of a Bill in Parliament to that end, and eventually to induce the Colonial Legislatures to bring their copyright laws into line with those of the United Kingdom

That a further object of the Society shall be to take such steps as may be deemed necessary or advisable to prevent piracy or infringement of artistic copyrights, and

To give information on copyright questions to members of the Society

That painters, sculptors, architects, designers, engravers, owners of works of art, print publishers, print sellers, dealers in works of art, photographers and all interested in the subject of artistic copyright shall be eligible for membership of the Society

That election of members shall be vested in the Committee Application for membership to be made to the Honorary Secretary in writing

That the annual subscription be £1 1- payable on January 1

* These form the Executive Sub Committee

THE NATIONAL PHOTOGRAPHIC RECORD ASSOCIATION

PRESIDENT - Sir J Benjamin Stone, M P

HON SECRETARY -Geo Scamell, 21, Avenue Road, Highgate, London

HON TREASURER —A Graham, F S A

The Association has been founded for the purpose of forming a National Photographic Record of existing objects of interest throughout the British Isles The photographs are intended to be deposited in the British Museum for public reference The photographs are in no way restricted to archæological subjects, but include ethnological, geographical, geological subjects, etc The Central or Standing Committee will receive all prints for the British Museum collection, and, if approved will mount and deposit them in the British Museum All arrangements for deposits in county or other museums will be left to local Societies that have undertaken the photographic survey of their respective counties Prints to be in platinum or some other permanent process and whole plate, 8½ by 6½, to be considered standard size, but ½ or ¼ plate are accepted

MEMBERS OF COUNCIL

The Right Hon the Earl of Crawford, K T
Sir E Maunde Thompson, K C B , D C L
Sir H Trueman Wood, M A
George E Brown, F I C
C E Fagan
L Fletcher F R S
H W Fincham
W H St John Hope, M A
Rev F C Lambert
B F Lawrence, LL D
A Mackie
J W Marchant
G A T Middleton
Dr H R Mill
N B Stone
H Snowden Ward
Mrs Catherine Weed Ward
H B Wheatley, F S A

PHOTOGRAPHIC SURVEY ASSOCIATIONS

PHOTOGRAPHIC SURVEY OF EDINBURGH AND DISTRICT

SECRETARY Jas Oliver, Edinburgh Photographic Society, 38, Castle Street, Edinburgh

PHOTOGRAPHIC SURVEY OF ESSEX

Headquarters Essex Museum of Natural History, Romford Road, Stratford

PRESIDENT T S Dymond, F I C , F C S SECRETARY —A Taylor, Hurstleigh, Buckhurst Hill, Essex

PHOTOGRAPHIC SURVEY OF KENT

PRESIDENT - Sir David Salomons

SECRETARY H E Turner, B A B Sc , 14, Queen's Road, Tunbridge Wells.

PHOTOGRAPHIC SURVEY AND RECORD OF SURREY

PRESIDENT -Hon Henry Cubitt

SECRETARY - Frank F Wood, 11, Milton Road, Wallington

PHOTOGRAPHIC RECORD AND SURVEY OF SUSSEX

PRESIDENT —The Duke of Norfolk, E M , K G

The SECRETARY, Public Library, Brighton.

PHOTOGRAPHIC SURVEY OF WARWICKSHIRE

PRESIDENT, Sir J Benjamin Stone, M P

SECRETARY —Geo Whitehouse, 7, Wye Cliff Road, Handsworth, Staffs.

HON CURATOR (to whom all prints should be sent) E A Biermann, 63, Ludgate Hill Birmingham

HON TREASURER —P T Deakin, 19, Digbeth, Birmingham.

PHOTOGRAPHIC SURVEY OF WORCESTERSHIRE

SECRETARY —Walter W Harris, 101, High Street, Worcester

THE LINKED RING

The Linked Ring is composed of a number of photographic workers with artistic aims They conduct the Photographic Salon, an annual exhibition of selected pictures at 5a, Pall Mall East, London, W C The members of the Linked Ring are as follows

C Yarnall Abbott
John H Anderson
J Craig Annan
M Arbuthnot
Ernest R Ashton
Walter Benington
A H Blake,
David Blount
F A Bolton
Maurice Bremard
Tom Bright
Mrs Brigman
Maurice Bucquet
W A Cadby
Mrs Carine Cadby
Eustace Calland
Lyonel Clark
Archibald Cochrane
Hector Colard
Reginald Craigie
L David
George Davison
F Holland Day
Robert Demachy
Mary Devens
W B Dyer
Charles Emanuel
Frederick H Evans
Mrs Michael Foster
John Pattison Gibson
Karl Greger
Georges Grimprel
J M C Grove
Hugo Henneberg
Theodor and Oscar Hofmeister
Charles Job
J Dudley Johnston
Mrs Gertrude Kasebier
Alexander Keighley
Thomas Manly
Alfred Maskell
F J Mortimer
H W Muller
C Puyo
Ralph W Robinson
Mrs E L Watson-Schutze
Mrs Sarah C Sears
Dr F von Spitzer
Eduard J Steichen
Edmund Stirling
Frank M Sutcliffe
Carl Ulrich
J B B Wellington
W Willis

Registrar of the Linked Ring Charles Emanuel, 67, Ladbrooke Grove, London

Secretary of the Photographic Salon —Reginald Craigie, 32, Windsor Court, Hyde Park, W

THE SOCIETY OF COLOUR PHOTOGRAPHERS

SECRETARY Henry J Comley, Surrey House Stroud, Glos

PORTFOLIO SECRETARY - F T Hollyer 9, Pembroke Square, W

COMMITTEE —George E Brown, F T Hollyer, A J Newton, E J Wall, and the Secretary

The Society has for its objects "to further the progress of colour photography" It is open to all interested in colour photography, the annual subscription being 5s

The avowed activities of the Society are

(a) The mutual interchange of ideas and experiences in colour photography by means of a circulating portfolio of specimens and MSS, which shall include questions and replies.

(b) To obtain for members assistance from more experienced workers through the medium of the honorary secretary.

(c) To hold an annual exhibition in London, open to members and non-members at the time of the general meeting

(d) To form a permanent collection of specimens, apparatus, etc

THE AFFILIATION OF PHOTOGRAPHIC SOCIETIES WITH THE ROYAL PHOTOGRAPHIC SOCIETY OF GREAT BRITAIN

CHAIRMAN —The Right Hon the Earl of Crawford, K T, F R S

CHAIRMAN OF EXECUTIVE COMMITTEE P Bale Rider

ACTING SECRETARY -H Philp, 35, Russell Square London, W C

BENEFITS AND PRIVILEGES —Affiliated Societies are entitled to the following benefits and privileges —

The loan of illustrated lectures on photographic and kindred topics, sets of lantern slides, lantern lectures, pictures for exhibition, etc, and interchange of lectures and lecturers between the affiliated societies

Permits to photograph (see below)

One copy of each issue of the "Photographic Journal, in which are published the proceedings of the Affiliation Committee, the Transactions of the Royal Photographic Society of Great Britain, etc

Admission to the Annual Exhibition of the Royal Photographic Society of Great Britain at reduced prices

Members of affiliated societies joining the Royal Photographic Society of Great Britain receive exemption from the payment of entrance fees, provided they have been for at least two years members of an affiliated society The secretaries and delegates of affiliated societies are empowered to propose and second the nominations of such candidates

Temporary use of the accommodation provided by the various societies to members away from their own districts

Annual competitions of pictorial photographs and lantern slides are arranged

JUDGES OF COMPETITIONS —A Board of Judges is prepared to meet three or four times per annum, at 35, Russell Square, to adjudicate upon competitions arranged by affiliated societies The exhibits must be sent to the secretary, with full details of the competition, and it is to be understood that the judges will follow the rules adopted by the conference of judges (see below) The judges will not undertake to criticise any work submitted

MANAGEMENT —Every affiliated society has a voice in the management of the affiliation through the two delegates which each is entitled to appoint The general body of delegates meet at least twice a year, the business in the meantime being conducted by an executive committee The two delegates appointed by each society need not necessarily be members of the society they represent The entire income of the affiliation is placed by the Royal Photographic Society in the hands of the executive committee, which has to defray all expenses in connection with the work of the affiliation with the following exceptions —The Royal Photographic Society provides meeting-rooms, and office accommodation free of charge

PERMITS TO PHOTOGRAPH — Arrangements have been made whereby members of affiliated societies will be permitted to photo-

graph in or at the following places without other formality than the production of the Red Book (which is non-transferable), if required by those in charge This permission is subject to any special arrangements that may be made from time to time by the authorities, and it should be understood that these concessions are granted as a matter of grace and not as rights Holders of the Red Book are expected to act accordingly - Alexandra Palace and Park, Bristol Cathedral, Hereford Cathedral, Lichfield Cathedral, Romsey Abbey, Burnham Beeches, *Bushey Park, Coulsdon Common, Farthingdown, Guildford, Abbotts (Trinity) Hospital, Guildford, Town Hall Interior "at convenient times," Guildford, Holy Trinity Church, Guildford, St Mary's Church, Kenley Common, Riddlesdown, West Wickham Common, *Green Park, *Greenwich Park, *Hampton Court Park, Gardens, and Green, Highgate Wood, *Hyde Park, *Kensington Gardens, *Kew Green, Queen's Park (Kilburn), *Natural History Museum Gardens, *Parliament Square Gardens, *Primrose Hill, *Regent's Park, *Richmond Park and Green, *St James's Park, St Paul's Churchyard (to 12 noon), *Victoria Tower Gardens

The societies forming the affiliation are indicated by an * in the list of photographic societies preceding and following

CONFERENCE OF JUDGES —The following rules and recommendations concerning photographic exhibitions, adopted by a meeting of judges, convened by the affiliation on April 11, 1900, and revised in June, 1903, have received the approval of the judges, whose names are published annually in the Photographic Red Book The committee of the affiliation entertain the hope that every affiliated society will endeavour to conform to them as closely as possible The rules are known to have proved decidedly beneficial in the past

RULES —1 The judges' decision upon the merit of the exhibits shall be final, and they shall not be asked to decide any other point

2 The judges shall have full power to withhold any award, and this shall be stated in the prospectus

3 The judges shall have power to exclude all persons from the room while judging

4 The judges' expenses shall be paid

5 The judges shall not adjudicate upon pictures exhibited as produced with wares of special trading firms

6 No award shall take the form of a money prize

7 Where there is a champion class, pictures which have previously taken awards in Open classes shall be exhibited in the champion class only

8 An award shall be made to one picture only, whether it is in print, lantern slide, or other form, but in cases where the exhibition rules provide for slides to be exhibited in sets, the award shall be made to the best slide in the best set

THE SCOTTISH PHOTOGRAPHIC FEDERATION

PRESIDENT - Sir Carlaw Martin, LL D

SECRETARY - John B Maclachlan, Blairgowrie

SECRETARY (Portfolio) —J D Ross, 8, Latch Road, Brechin

* In those places indicated by an asterisk only *hand cameras* may be used under this permit, and the photographing of persons or groups is not permitted

SECRETARY (Lantern Slide).—R. Marshall, 3, Park Terrace, Grangemouth.

The Federation promotes annually the Scottish Photographic Salon. The 1910 Salon will open in the Albert Galleries, Dundee, on January 29, for three weeks.

SALON SECRETARY.—Vaness C. Baird, Broughty Ferry.

BOARD OF SELECTION.—J. Craig Annan, Arch. Cochrane, and W. B. Lamond, R.B.A.

The Federation consists of 47 societies.

THE YORKSHIRE PHOTOGRAPHIC UNION.

PRESIDENT.—J. Atkinson (Hull).

HON. BUSINESS SECRETARY.—Ezra Clough, 10, Farcliffe Road, Bradford.

HON. SECRETARY (Lantern Slide Section).—W. H. Houghton, 26, Ravensknowle Road, Dalton, Huddersfield.

HON. SECRETARY (Print Portfolio Section).—Lionel Dickinson, 113, Athol Mount, Overton, Yorks.

The Union consists of 29 societies.

THE LANCASHIRE AND CHESHIRE PHOTOGRAPHIC UNION.

PRESIDENT.—John Barr, M.B., J.P. (Blackburn).

SECRETARY.—W. Tansley, 22, Chapel Place, Liverpool.

HON. SEC. (Lantern Slide Section).—T. Hudson, 6, Rigby Street, Nelson.

HON. SEC. (Print Portfolio Section).—J. Frankland, 8, Greengate, Barrow-in-Furness.

A year-book is published, with a list of lecturers and demonstrators, etc.

The Union consists of 51 societies.

MIDLAND PHOTOGRAPHIC FEDERATION.

SECRETARY.—Lewis Lloyd, Church Road, Moseley, Birmingham.

The Federation consists of 45 societies.

FEDERATION OF THE PHOTOGRAPHIC SOCIETIES OF NORTHUMBERLAND AND DURHAM.

PRESIDENT.—W. S. Corder.

SECRETARY.—James Whittle, F.C.S., 30, Bridge Street, Morpeth.

The Federation consists of 15 societies.

THE AMERICAN FEDERATION OF PHOTOGRAPHIC SOCIETIES.

PRESIDENT.—George W. Stevens, Director Toledo Museum of Art, Toledo, Ohio, U.S.A.

SECRETARY.—C. C. Taylor, 3223, Cambridge Avenue, Toledo, Ohio, U.S.A.

Founded for the advancement of pictorial photography, the encouragement of photographic record, etc. The American Salon is promoted annually by the Federation, and after the first exhibition in New York makes a tour of some twelve leading centres.

THE PHOTO-SECESSION.

DIRECTOR.—Alfred Stieglitz, 1111, Madison Avenue, New York, U.S.A.

Place of meeting, 291, Fifth Avenue, New York. The Secession holds continuous exhibitions.

THE BRITISH JOURNAL
PHOTOGRAPHIC ALMANAC

AND

Photographer's Daily Companion

INCORPORATING

The Year Book of Photography and Amateurs' Guide

1910.

EDITED BY GEORGE E. BROWN, F.I.C.

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PREFACE.

Scarcely any change has been made in the arrangement of the contents; it has been found possible to put the directory of photographic societies in more compact form, but that is really the only alteration. The order of the sections of the book and, further, of the sub-sections in each is retained precisely. That uniformity in this respect is desirable is evident from the many letters which reach "The British Journal of Photography" quoting articles and formulæ in past "Almanacs," and showing that the back volumes of the "Almanac" are constantly turned to for information. It will be noticed that in many instances in the present volume subjects are connected with what has been previously published by reference to past issues of the "Almanac," so that the volumes permit of recent progress in the various branches of practical photography being rapidly scanned.

It only remains to thank all those who by their suggestions and corrections have assisted in the production of the "Almanac," and to wish them and the friends of the "British Journal" everywhere all success during 1910.

GEORGE E. BROWN,
Editor.

24, Wellington Street, Strand, London, W.C.
October 25, 1909.

LONDON: HENRY GREENWOOD & Co.,
Publishers of *The British Journal of Photography*,
24 Wellington Street, Strand, W.C.

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OBITUARY OF THE YEAR.

Among those whose deaths have taken place since the publication of the 1909 ALMANAC are —

R H Bow (Feb 17, 1909) Walter Tyler (July 28, 1909)
Hector Maclean (April 4, 1909) Douglas Carnegie (Oct 1, 1909)

R H Bow

In the death of R H Bow, at Edinburgh, on February 17, 1909, another of the links connecting us with the earliest days of photography is severed Mr Bow had attained the great age of 82, and therefore had largely outlived the reputation of his optical and scientific investigations carried out about the middle of the last century Indeed many of Mr Bow's papers and researches did not at the time receive the attention they deserved, and it was left to Dr von Rohr in "The British Journal of Photography" some two years ago to remind the present photographic generation of Bow's pioneer work in photographic optics It was R. H Bow who, with Thomas Sutton, pointed out the true orthoscopy of a symmetrical lens for one scale of reduction only Bow also investigated the unevenness of illumination by photographic lenses due to the thinning of the glasses at the margins, and he sought to overcome this defect by tinging the substance of the crown glass He investigated the conditions of anastigmatism in 1863, and first published a plan of registering the results of anastigmatic calculations

Mr Bow also anticipated much of the later work in his views of perspective, and constructed apparatus for the correct observation of views made with a short focus lens His papers on these subjects, as well as his masterly treatment of stereoscopic photography, appeared in "The British Journal of Photography" and in "The British Journal Almanac" Mr Bow was a member of the Edinburgh Photographic Society from the year of its foundation (1861) until the time of his death, and in the old days was one of its most active supporters

HECTOR MACLEAN

By the sudden death from heart failure on April 4, 1909, of Hector Maclean there was removed from the photographic world a personality not readily replaced Mr Maclean was essentially a commentator on men and things Gifted with a power of facile expression and a sense of ironic humour, he enlivened many a photographic passage at arms which, but for him, would have been dull. Without a very deep knowledge of the principles of photography he was, nevertheless, a very capable expositor of new processes and methods, and was the author of several text-books and the writer of many articles in the photographic Press His personal interest in the photographic societies with which he was connected, formerly the Croydon Camera Club, and latterly the Sutton Photographic Club, was very actively displayed He took a very large share in the survey and record work in the county of Surrey In the "Morning Post," to which he contributed weekly for some years a column of photographic notes, he brought the current progress

in photography very simply before his lay readers, and in other ways assisted to popularise the use of the camera

Walter Tyler

The death of Walter Tyler, head of the well known firm of Walter Tyler, Limited, Waterloo Road, London, S E, took place on July 28, 1909 Mr Tyler, who for nearly forty years had been a prominent and leading member of the optical lantern trade, retired from active business life about three years ago, hoping to spend some years of ease and recreation at his residence at Teddington, but unfortunately this period of well earned rest was all too brief At the time of his death Mr Tyler was 62 years of age

Douglas Carnegie

The sad news contained in the London papers of October 1, 1909, came to many photographers with a sensation of grief For the past few years Mr Carnegie had been successfully engaged in lecturing upon scientific subjects under the University Extension Society Yet he himself was subject to moods of depression, during which he took the most pessimistic view of his work His death in a Darlington hotel came as a tragic ending to this strange illusion

The son of a doctor, Carnegie was born in China, but received his early education at Staveley Grammar School and at Epsom College From the latter place he gained an exhibition scholarship of London University, and proceeded to Caius College, Cambridge where, after a distinguished career in science, securing a double first in Parts 1 and 2 Natural Science Tripos, he became assistant lecturer and demonstrator in the chemical laboratory of Caius College, a post which he held from 1884 to 1889 In 1890 the care of his health led him to accept the chair of chemistry in Colorado University, U S A, but in 1893 he returned to England to become science master at Leys School, Cambridge For some time also he acted as research chemist to the Cambridge Colour Works, Loughton

In photography, our readers will no doubt be aware of his work in conjunction with his friend Welborne Piper on the action of bichromate on the silver negative image, published in the "Amateur Photographer" in 1905 experiments which led to the present chromium intensifier His later papers on the theory of pinhole photography, on the H and D photometer, and, quite recently, on the sulphide toning process were published in the "British Journal of Photography"

Among others whose deaths have taken place during the past year are W E Downey, well known in association with his father, Mr William Downey as the photographer of Royalty, W D Brigham, one of the early photographic workers in Yorkshire, G W Morgan, of the well-known Aberdeen firm of photographers, and inventor of the system of dry-mounting named after him, Herr von Jan, who specialised in the photography of the female form, Richard Wicks, of the Brighton Photographic Company Dr C E Merck, partner in the firm of E Merck, of Darmstadt, Romain Talbot, the oldest member of the photographic trade in Germany, and W Knapp, head of the well-known Halle publishing firm

LENS CALCULATIONS BY MENTAL ARITHMETIC:

OR, THE PHOTOGRAPHER'S READY RECKONER.

By the Editor

IN the editorial article which has been a feature of the Almanac for many years the aim has been to provide a review of recent progress in some one sub-section of photography, to deal with some quite new innovation in photographic processes, or to draw together the threads relating to some photographic topic of importance scattered in periodicals throughout a number of years. In electing a subject for the present year it was therefore natural to think first of the oil and "bromoil" processes to which much attention is being given by pictorially inclined photographers, and next, perhaps, to the varieties of phosphate printing papers, the characteristic qualities of which have attracted a good deal of interest during the past twelve months (November, 1908, to November, 1909). But in regard to the first of these two subjects it was felt that their chief interest is in the manual operations of "pigmenting" the image, and that the comparatively few and simple modes of chemical treatment prior to this stage of the process do not call for a detailed review. On the other hand, the phosphate emulsion papers are of too recent introduction to warrant a monograph on them. Both they and the "oil" processes are quite adequately and more conveniently dealt with in their respective sections in the "Epitome of Progress."

Meanwhile the idea occurred to me to present to photographers, in what I believe is a simpler and more popular manner than hitherto done, the calculations which have to be made as to reproduction by lenses on a reduced or enlarged scale. We all know that exact optical formulæ exist for this purpose, but I venture to say that not 1 per cent. of the readers of this "Almanac" would think of making use of them in actual work. Therefore I propose to impress upon those who have shunned all such formulæ the really simple way in which any ordinary lens calculation can be worked out by anyone who knows the usual rules of multiplication and division. It will be seen that the essence of this simplified method is the doing of the calculation in several stages instead of all at once by formula. This

can be done very simply and with quite sufficient accuracy by making the "extra focal distance" (E F D) of image or object the subject of the calculation in place of the conjugate focal length which is usually employed There is nothing new in the use of the E F D , it will be found mentioned in the "Optical Tables" which have appeared in the "Almanac" for several years past All I can claim for the following article is that it points out the aid to ready reckoning which is afforded by the E F D , when coupled with a recognition of the fact that when it is used certain small values in the calculation may be neglected without in any way affecting the results from the practical point of view With this much by way of introduction we may come to our subject

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All the ordinary calculations which one requires to make when copying, enlarging, etc , become greatly simplified if one calculates first the so-called "extra focal distances" By this term, "extra focal distance," is meant the distance from the original or from the plate *extra* to the focal length of the lens To take an example which will serve both to make clear the "extra focal distances" and to lead to the rule in using them When copying same size we know that original and plate must each be at a distance from the lens double the focal length of the lens The state of things may be represented thus in the case of, say a 6 in lens —

Fig 1

Here the extra focal distance (that beyond the focal length of the lens) is 6 ins on each side, that is to say, when the degree of reduction or enlargement is 1, the extra focal distances are each equal to 1 focal length

Suppose we are copying to half size (linear) or enlarging to twice size (linear) Again with a 6-in lens we may calculate from the formulæ that the distances are as follows —

When copying —

Fig 2

When enlarging —

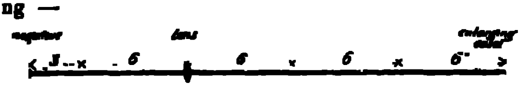

Fig 3

Here the extra focal distances are 12 ins and 3 ins , and we notice that when the scale of reduction or enlargement is 2, the greater

extra focal distance is twice the focal length of the lens and the smaller is half the focal length of the lens Similarly, if the scale of reduction or enlargement is 3, these extra focal distances are three times and one-third respectively the focal length of the lens It will be seen that so long as we leave out for the moment from our calculations the one focal distance on either side of the lens the matter resolves itself into the simplest form of arithmetic It will help us to work on this system if we imagine the lens pierced by a solid rod which projects on either side to a distance equal to the focal length

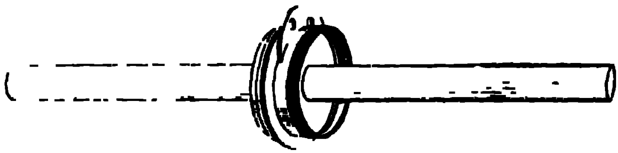

Fig 4

Until our calculation is well-nigh done we must regard the space occupied by the bar as a kind of optical no-man's land, not to be considered until we have found the extra focal distances, to each of which latter we then add the focal length of the lens Let us now state the very simple general rule when finding the extra focal distances and then see how very much more simple it is in use than the formulæ of conjugate foci which are generally given in the text books, and, further how very simple the common lens calculations of everyday use then become

When copying or enlarging, say, four times, the greater extra focal distance is four times the focal length of the lens and the smaller extra focal distance is a quarter the focal length of the lens Similarly five times and one-fifth for a scale of five times, and so on for any given scale of enlargement or reduction

To arrive at the actual distances from lens to the original and from lens to sensitive plate or paper one focal length is added to each extra focal distance

Example, copying on quarter scale with 6-in lens —

Greater extra focal distance is 6 ins × 4 = 24 ins
Smaller extra focal distance is 6 ins ÷ 4 = 1½ ins

Adding the focal length in each case we get —

Extra focal distance	24 ins
One focal length	6 ,,
Distance from lens to original	30 ,,

Extra focal distance	$1\frac{1}{2}$ ins
One focal length .	6 ,,
Distance from lens to plate	$7\frac{1}{2}$

At the risk of making the calculation appear formidable the stages are set out as above, in order to show that the process is one which can be carried out in the head, without reference to tables or memoranda, once the simple relation between the scale of reduction, the focal length of the lens, and the extra focal distances has been grasped

We can assume that the worker knows the focal length of his lens The first thing, therefore, to be found is the ratio of reduction or enlargement desired for the particular work in hand, In every case this will be the ratio of linear reproduction An enlargement of three times is one in which a length of 1 in in the negative becomes 3 ins in the enlargement As regards area, this is a nine times enlargement, but calculations as to focal length cannot be done simply on such (area) ratios of reproduction To discover the ratio to be used we divide the long side of the plate into the long side of the original, and the result is the ratio Thus in the case of a painting, say, 3 ft 2 ft, to be copied on a quarter plate,

3 ft -- 36 ins
36 - 4 = 9

—i e, reduction number is 9

It is well, as a rule, to take the length of the plate fairly under its actual measurement, in order to make sure of the copy falling clear within the space of the ground-glass Therefore it is not necessary for practical purposes to use fractions of an inch when dividing the length of the original by that of the plate Fractions also may be neglected in the case of ratios more than, say, 3 Thus it will be understood that it is an easy matter to work out this first stage of the calculation without paper and pencil

CALCULATIONS WHEN COPYING

When making a copy we multiply the focal length of the lens by the ratio—again done in the head—and add one focal length thereto The result is the "object distance"—i e, of lens from original

To get the image distance—i e, of plate from camera—we *divide* the focal length of the lens by the ratio of reduction and add 1 focal length In practice there is usually no occasion to perform this operation, because when we have placed the camera at the correct object distance from the original all that remains to be done is to focus the image sharp If, for focussing, the back, not the front, of the camera is moved, the scale of reproduction is not altered at all, it is that fixed by the position of the camera But if the lens is moved in order to obtain sharp focus the scale of reproduction is altered The alteration is not much when an

original is being reduced considerably—say, to a quarter its width or to less—but is very considerable indeed when there is not much reduction In such cases it is indispensable for rapid work to use a camera in which focussing can be done by moving the back, the lens remaining stationary

When copying direct in the camera on an enlarged scale, the most convenient method is to make the calculation as though we were enlarging in the ordinary way in a lantern We decide what the ratio of enlargement is to be—say 2, 2¼, or 2½ times, etc — and multiply the focal length of the lens by this ratio Add to the result 1 focal length, and we get the image distance from lens to plate The camera is then moved up towards the original until the latter is in sharp focus This is the most accurate and expeditious method of securing a given scale of (enlarged) reproduction Theoretically, the final adjustment of focus should be done by moving the original to and from the lens, but it will usually serve every purpose to use the rack and pinion of the lens or of the camera front after the best possible focus has been secured by moving the camera as a whole towards or away from the original We are, of course, speaking here of the use of a camera on a copying board on which both it and the original can be moved in alignment with the axis of the lens

Example —A print 4 × 3 ins to be enlarged to 12 × 10 ins plate with a 7-in lens

Ratio of Enlargement, 3

To find image distance

E F D (image) = 7 ins × 3 =	21 ins
Adding 1 focal length	7 ins
Distance from lens to plate	28 ins

To find object distance

E F D (object) = 7 ins ÷ 3 =	2⅓ ins
Adding 1 focal length	7 ins
	9⅓

From this it will be seen why it is better to set the camera extension by measurement, and to focus by moving first the camera and then, very slightly, the lens The true "depth of focus" in the case of the much narrower angle of rays which reaches the plate is much greater than that on the other side of the lens That is to say, we have to move the plate much more to obtain an appreciable alteration in focus than we have to move the original from the lens (or *vice versa*) to obtain the same difference, just as it is easier to focus with a lens of short focus than with one of long focus

* * * * *

The "extra focal distance" method permits with equal readiness of other problems being worked out in the head Suppose, for

example, we have to photograph an object from a point some distance off, and cannot approach nearer We require the image a certain size, and want to know what focus of lens is necessary The simple rule that a reduction figure of, say, 5 means an "extra focal distance" of 5 times the focal length of the lens may be used here, not quite exactly, but near enough for practical purposes For example, we have a mural tablet 3 ft in diameter, which on account of its height has to be photographed from an upper window on the other side of a 30 ft roadway We want the tablet, say, 5 ins on the negative Here our scale of reduction is 36 ins (3 ft) divided by 5 = say, 7 The distance (30 ft) is our "extra focal distance" *plus* the focal length of lens to be used As we know that the E F D is equal to the focal length multiplied by the reduction number—that is, it equals 7 focal lengths—the whole distance of 30 ft is equal to 8 focal lengths, so that by dividing 30 ft by 8 we get the focal length which is necessary

30 ft - 360 ins

360 – 8 45 ins

As a lens of such focus is not likely to be available it is evident we must be content with a smaller size of image or use a telephoto attachment The latter, of course will readily surmount a problem such as this, but we may use the conditions above mentioned to illustrate another variety of problem occurring in practical work, and similarly susceptible to ready calculation

To calculate size of given object in photograph taken at given distance with lens of given focal length

In the preceding case we have an object 36 ins in width 30 ft away Supposing that our longest focus lens is 20 ins, what size image shall we get? Our "extra focal distance" is 30 ft (360 ins) less 20 ins = 340 ins Since this E F D is made up by the focal length of lens multiplied by the reduction figure, the latter is equal to the E F D. divided by the focal length That is, dividing 340 by 20 we get the scale of reduction—

340 ÷ 20 = 17

In other words, the image will be 1-17th the original, so that our 3 ft tablet will be 2 4-17 or 2¼ ins in width in the negative

A Method of Measuring the Focal Length of the Lens

Before passing to the use of the E F D in studio calculations, reference may be made to a ready method of finding the focal length of a lens which requires no apparatus beyond a camera and a rule It depends on forming an image of as large a distant object as possible in the camera, measuring

1, the distance of the object,

2, the scale of reduction,

and from these two calculating the focal length of the lens A commonly advised form of this method is to copy an object same

size, and then to divide the distance from plate to original by 4 to get the focal length of the lens The exact adjustment to same size is not easy owing to the depth of focus when copying same size It is more accurate to copy a very large distant object, disregarding the exact scale of reduction, and then calculate the focal length by the following rule* —

Ascertain the distance from focussing screen to object in inches, multiply this by the reduction number, and divide the product *twice* by the reduction number increased by 1

Thus if total distance is 43 ft and the degree of reduction 50, the calculation will be

```
        43 ft
        12
       ----
       516 inches
        50

   51)25,800
        ---
   51)  559

        11 inches (very nearly)
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The chief essential to accuracy in this method is to get as long an image distance as possible to measure, therefore it is well to mark two fine lines in the ground glass as far apart as possible

The distance between these two lines forms the image The object is caused to conform to it by making it of two white rods or cords placed say 40 or 50 ft from the lens and at such distance apart that their images fall on the marks on the ground glass It is only then necessary to measure the distance between the two rods, and to divide by the distance between the marks on the ground glass

STUDIO CALCULATIONS

It is not too much to say that the majority of photographers whose work is limited to portraiture in the studio feel altogether at sea as soon as any kind of a calculation as to lenses has to be solved Their first refuge is probably to some volume containing tables in

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* The basis for the arithmetical rule is as follows
The distance from plate to object is made up of

E F D (object) + E F D (image) + 2F

E F D object = $r \times F$

E F D image = $1/r \times F$

where F is the focal length to be found and *r* the ratio of reduction,
Therefore total distance from object to plate is F (r + 1/r + 2)

$$F = \frac{\text{distance of focussing screen from object,} \times r}{(r + 1)(r + 1)}$$

which the information can be found without thought on the part of the inquirer It can be shown, however, that the studio lens-calculations of which photographers have need are of a kind which can readily be done in the head or on Mr Balfour's proverbial "half-sheet of notepaper"

Studio calculations naturally relate to the focal lengths of lenses which can be used, to the dimensions of studios and such like—in every case with reference to the portraiture of customers This last condition simplifies matters Our subjects do not vary very greatly in size, and we shall not be far out in assuming the height of the two most usual subjects in the studio to be as follows —

Full-length figure, height	68 ins
Head and shoulders, height	30 ins

Two further fixed positions which come into all studio calculations are the spaces which must be provided behind the sitter for the background and behind the camera for the operator These may be put down as follows —

Behind the sitter (background)	3 ft
Behind the camera (operator)	3 ft
	6 ft

This means that whatever length of studio we may arrive at for a given kind of work we must not forget that 6 ft must be *added on*, and, *vice versa*, in calculating what lens we can contrive to use in a studio of given size one must start by *subtracting* 6 ft and take the remainder as the distance available for the action of the lens

With these provisions we can take a look at the method of doing any necessary lens sum in the studio

* * * * *

So far as concerns the action of the lens, portraiture is merely a form of reproduction on a reduced scale, and follows just the same rule as copying a picture—that is to say, the "extra focal distance" of the subject is equal to the focal length of the lens multiplied by the degree of reduction Studio portraiture being done on plates of certain particular sizes, the reduction does not vary very much Thus, in the case of a cabinet (6 × 4¼) print, the figure will usually measure 5 ins on it, so that the degrees of reduction in the cases of a full-length figure and head and shoulders will be —

Full length	68 ÷ 5 = 13 (nearly)
Head and shoulders	30 ÷ 5 = 6

In the case of C D V portraits the degree of reduction is, of course, greater, in the case of Boudoir or Imperial portraits it is less, the reduction figures being obtained in each case by dividing the height of the actual subject by the height of the image The

reduction figures of the most common sizes of photographs are thus as follows :—

Name and Size of Photograph	Carte de V.	Cabinet	Boudoir	Imperial
Height of image on photograph	3	5	7½	9
For full length portrait, reduction figure is	23	13		7½
For head and shoulders portrait, reduction figure is	10			3 nearly
	8	5¼	10	6¾

These figures are not so numerous but what they may be kept in mind for studio calculations, but in any case they, or others for particular requirements, are at once arrived at by dividing, as already directed, the height of the image into that of the subject.

* * * * *

To take first one of the most frequent questions put by those who distrust their ability to perform lens calculations :—*Will a studio of given length, say 20 ft., allow of a certain class of work, say, full-length cabinet figures, being done with the ordinary cabinet lens, e.g.,* the Dallmeyer No. 3 B of 11½ ins. focal length. In this case we are copying on a scale of 1/13th; that is, our reduction figure is 13. Therefore we know that the E.F.D. in front of the lens is 11½ × 13, that behind the lens is 13 ÷ 11½. As in all our other calculations, we must not forget the focal length on either side of the lens, in this case 11½ × 2, and to this sum we add the 6 ft. allowance for background and operator. Jotted down on an envelope the calculation is:

E.F.D. (object)	150 ins.
E.F.D. (image), say	1 in.
Two focal lengths	23 ins.
Working space (6 ft.)	72 ins.
	246 ins.

Necessary working length in studio 20 ft. 6 ins.

That is to say, 20 ft. will just suffice.

* * * * *

In such calculation as this one must remember that the total necessary length in the studio is composed of four parts :—

1. E.F.D. object (before lens) = focal length × reduction figure.
2. E.F.D. image (behind lens) = focal length ÷ reduction figure.
3. Space of one focal length in front of and behind lens = focal length × 2.

4 Convenient working space, say, 3 ft., behind sitter, and same space behind camera, = 6 ft.

The total of these figures gives the wall-to-wall length of the studio.

It will help us to remember if we look at the same kind of problem another way. Using a lens of 10 ins. focus in a studio 18 ft. long, what degree of reduction is possible? That is, what descriptions of portraiture in the above table A can be done?

	ins.
Length of studio 18 × 12	216
Subtracting working space	
	144
Subtracting two focal lengths	20
	124

This distance (124 ins.) is composed of both the front and back E.F.D.'s. We could find the *exact* value of the reduction figure corresponding to the focal length of 10 ins. by making allowance for this fact, but as the back or image E.F.D. is so small, it is near enough to reckon 124 as being the front, or object E.F.D., and then, as we know, the reduction figure is this length divided by the focal length of the lens—*i.e.*,

$$124 \div 10 = 12\frac{1}{2},$$

which shows us that the greatest reduction we can get is not quite enough for full length cabinet figures.

* * * * *

To put the same species of problem in still a third way, suppose that in a studio 35 ft. in length we wish to make midget photographs of head and shoulder portraits, and have only a lens of 12 ins. focal length. We want to know if the length of the studio will allow of this being done. Here we can find either the length of studio necessary when using a lens of 12 ins. focus or the maximum focus of lens allowable when working in a studio of 35 ft. We will do the latter:—

First calculating the degree of reduction, we divide the height of the sitter (head and shoulders = 30 ins.) by the height of the image on the midget print (say, 2 ins., or a reduction of 15).

From the total length of the studio (35 ft.)	=	420 ins.
We subtract for working space of	=	72 ins.
		348 ins.

This remaining length is made up, as we have learnt, of:—

Two focal lengths = focal length × 2,

Object E F D = focal length × reduction number
= focal length × 15

Image E F D = focal length ÷ by reduction number
= 1/15th of the focal length

This last is so small in comparison with the whole length of 348 ins of which it forms part that the result will not be affected appreciably by leaving it out We then see that the two components of the distance (348 ins) are —

2 focal lengths
15 focal lengths
---
17 focal lengths

Dividing 348 by 17 we get $20\frac{1}{2}$ ins the focal length That is, we can use lenses up to this focus quite well, so that there is ample space for using that of 12 ins

ENLARGING.

The calculations as to enlarging are very simple when worked on the E F D system Here, as in the studio, the space between the negative and the enlarging easel may be divided into three parts, viz -

1 One focal length of lens in front of and one behind the lens = focal length × 2

2 Image E F D (lens to easel less 1 focal length) = focal length × enlargement figure

3 Object E F D (lens to negative less 1 focal length) = focal length ÷ enlargement figure

Thus, in the case of enlarging from 4 × 3 to 12 × 10, the enlargement figure or ratio is 3 Using a 6-in lens the component distances 1, 2 and 3 above mentioned will be

1   6 × 2 = 12 ins
2   6 × 3 = 18 ins
3   6 ÷ 3 = 2 ins
-
32 ins

From which we see that, for an enlargement of 3, the distance either side of the lens is 8 ins towards the negative and 24 towards the easel, these being obtained, as before, by adding the focal length to the respective E F D's We believe that the reader will not need examples of the application of the rules, already given in different forms, for working out calculations, such as the distance from lens to easel for given enlargement with given lens, etc

EPITOME OF PROGRESS.

BY THE EDITOR.

In the following pages will be found classified abstracts of papers, communications, and articles describing progress in technical photography (art topics are excluded) which have appeared in the British and foreign Press during the twelve months Oct 20 1908, to Oct 20, 1909 It may have happened that some foreign journals have not arrived in time for abstraction, their contents will be dealt with in the 1911 "Almanac"

The general arrangement of the Epitome will be seen from the contents of the "Almanac," which follows the title page Each item is separately entered in the index at the end of the volume, and a list of the journals abstracted will be found at the conclusion of the Epitome

In a number of cases where information additional to that in the abstract has appeared in the "British Journal of Photography a reference to issue and page has been given

I.—GENERAL.

EVENTS OF THE YEAR

1909

Jan 1 to 9 —Sixth Scottish Salon Held at Wishaw ("B.J.," Jan 8, 1909, p 26)

Jan 6 to 27 —Northern Photographic Exhibition, held at Manchester ("B J" Jan 8, 1909 p 24)

Jan 8 to Feb 20 —Exhibition of "Scenes and figures of the Sicilian Coast" by W von Gloeden at the house of the "B J" ("B J," Jan 15, 1909, p 48)

Jan 12 to March 3 —Exhibition of portraiture by R Dührkoop at the Royal Photographic Society ("B J," Jan 15, 1909, p 48)

Feb 9 —Award of the Progress Medal of the Royal Photographic Society to MM Lumière et ses Fils "for the Autochrome process of colour photography and for their photo-chemical researches" ("B J.,"

Feb 12, 1909, p 115) A paper on the researches of MM Lumiere in photography and on the history of their firm by Major-General J Waterhouse appears in "Phot Journ" March, 1909, p 143

March 3 – Exhibition of "A series of impressions rendered by photography" by Malcolm Arbuthnot at the offices of 'The Amateur Photographer' ("B J," March 12, 1909, p 200)

March 9 to April 10 —Exhibition of photographs by members of the Affiliation of the R P S ("B J," March 19, 1909 p 220)

April 29 to May 17 Salon of the Paris Photo-Club, held at the Cercle Volney A review by M Demachy appears in "B J" June 4 1909, p 435

Dresden International Exhibition, held from May to October, 1909 General review appears in 'B J," May 21, p 395, scientific sections "B J ' May 28, p 417 and June 4, p 437 professional photography, B J " June 11, p 453 amateur photography, ' B J," June 18, p 471, photographic trade, 'B J' June 25, p 496, schools of photography and Austrian exhibits, "B J," July 2, 1909, p 514

May 4 to June 8 Exhibition of photographs in the bromoil process by F J Mortimer at the Royal Photographic Society ("B J,' May 7, 1909, p 365)

May 19 to July 31 —Exhibits of portraits of ' Fair Children" (of Royal and titled personages) by Richard Speaight, held at the galleries of Messrs Speaight, Ltd 157, New Bond Street London 'B J," May 21, p 403, and July 16, p 558, 1909)

May 28 to June 2 — Congress of Applied Chemistry, held in London The photo chemical section met under the presidency of Sir William Abney A report of the proceedings appears in "B J,' June 4, 1909 p 439

July to August Exhibition of photographs by Colonial readers of the Amateur Photographer ' Held at 52, Long Acre, London, ('B J ' July 16, 1909, p 558)

July 5 to 10 Twenty fourth meeting of the Photographic Convention of the United Kingdom held at Canterbury under the presidency of H Snowden Ward The proceedings are reported in the "B J,' July 9, p 530, and July 16, p 549, 1909 The 1910 meeting will be at Scarboro under the presidency of Mr Godfrey Bingley

July 19 to 24 Convention of the Photographers' Association of America held at Rochester, New York State and attended by close on 1,800 photographers A feature of the Convention was the visit to Kodak Park, and the hospitality of Mr George Eastman and the Board of the Eastman Kodak Co (' B J, August 13, 1909, p 623)

September 10 to October 23 - Seventeenth Photographic Salon held at 5A, Pall Mall East The Selecting Committee were —J Craig Annan, Frederick H Evans, Walter Benington, F J Mortimer, George Davison, J Dudley Johnston, M Arbuthnot, and Reginald Craigie (ex officio) ("B J," September 10, p 699, and September 17, p 720,1909)

September 23 to October 30 – Fifty-fourth exhibition of the Royal Photographic Society. ("B J," September 24, 1909.) Selecting and

Hanging Committees —Pictorial section A H Blake, Harold Holcroft, E T Holding, F T Hollyer, Charles F Inston, Arthur Marshall, and F. J. Mortimer Technical section F Cheshire, F R M S , W Farren, Douglas English, B A , Dr C Thurstan Holland, C E K Mees, D Sc , and Major-General J Waterhouse, I A Colour photography section Ernest Marriage, F Martin Duncan, and James A Sinclair

November 23 —Twelfth Traill-Taylor Memorial Lecture "The Growth of the Photographic Image." By Professor A W Porter, B Sc , F R A S (Announcement)

COPYRIGHT

Copyright in New Zealand —Complaints are made that the Registrar of Copyrights in the Dominion reads the New Zealand Fine Arts Copyright Act of 1877 to require compulsory prepayment of the fees for both registration and a certificate of the fact (amounting to 7s 6d) before registration can be effected —" N Z Phot ," Mar , 1909, p 3, " B J ," May 7, 1909, p 359

Copyright in America —Much disappointment is felt that in the Copyright Act which became law in the U S A on July 1 last photographers are singled out for a lesser degree of protection in their dealings with newspapers than is the case with other illustrators In the case of photographs damages obtainable in an action for infringement shall not exceed the sum of 200 dollars nor be less than 50 dollars This is an exception to the general ruling that damages shall not exceed 5,000 dollars nor be less than 250 dollars —" Bull Phot , ' Mar 3, 1909, p 137, " B J ," May 7, 1909, p 360

Proposed Changes in Copyright Law —The full text of the revised draft of the Copyright Bill drawn up by the Artistic Copyright Society is printed in " B J ," Jan 15, 1909, p 44 From an editorial article dealing with the provisions of the Bill of special importance to photographers it is seen that under the proposed Act British subjects will have copyright throughout the British Dominions in all their works, whilst foreigners have copyright within the British Dominions in those of their works made within the British Dominions It is proposed that copyright in photographs shall last for a term of thirty years after the expiration of the year in which the work was completed In the absence of a form or agreement in writing, the copyright in any work remains with the author, except in the case of a work of fine art, which is a portrait, and of a photograph made to order for a consideration, in both which cases the copyright belongs to the person giving the order upon payment of a consideration Photographs marked c do not require to be registered, but may still be registered, in which case the mark is R C A reduction is made in the registration fee when

a number of copyrights are registered at the same time In the case of a photographer whose assistant takes a photograph the employer is to be considered the author —"B J.," Jan. 15, 1909, p. 38

BUSINESS

Fraudulent Supply of Photographs—A case of considerable importance to the photographic profession was heard at Southampton Police Court on July 29, 1909 Mr S G Kimber, F R P S, summoned a firm of photographers in reference to the supply of silver prints as carbon photographs Defendants pleaded guilty, and were fined 10s and costs The case should apply a check to the fraudulent supply of the cheaper class of photographic print in place of carbons or platinotypes It is to be hoped, too, that the case will remind manufacturers of the opportunity for fraud on the part of the less reputable photographers created by the lack of sufficient explicitness in descriptive terms applied to printing papers other than those for the carbon and platinum processes—"B J," Aug 6, 1909, p 605

Amalgamation of German Camera Makers A combination consisting of the firms of Huttig and Sohn of Heinrich Ernemann, and of Emil Wunsche and Co, all of Dresden, the firm of Dr R Krugener, of Frankfort, and the camera department of Carl Zeiss, Jena, has been formed during the past summer (1909), with a capital of 4,000,000 marks

Photography in British Columbia—L Haweis, in two articles, the first of which appears in the Colonial and Foreign number of the "B J," discusses the conditions under which photographic trade must be obtained in British Columbia—"B J," Mar 26, 1909, p 233, and Apr 2, p 263

Photography in Japan—T B Blow, in the Colonial and Foreign number of the "B J," gives an account of present day conditions in Japan as regards professional photography and photographic manufacture—"B J," Mar 26, 1909, p 236

EDUCATION

Photographic Training of Girls—An account is given in "B J" Dec 11, 1908, p 940, of the L C C School in Vincent Square London, S W, where, among other subjects, instruction is given to girls in photographic trade work

II.—APPARATUS AND EQUIPMENT.

(Including Raw Materials Used in Photography)

The many details of pieces of apparatus published chiefly in patent specifications are not abstracted in this "Epitome," as space does not permit of the numerous drawings necessary for their explanation All patent specifications are abstracted in the "British Journal of Photography," and are entered according to subject and also under the name of the patentees in the index to the yearly volume of that publication which is issued with the last number of the year or the first of the year following

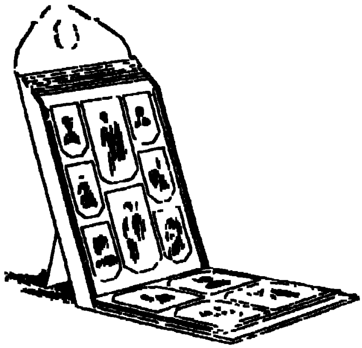
Dark Room and Studio.

Repairing Dishes, etc—G. W Webster recommends for the repair of porcelain dishes, glass measures, etc, the "Cementium" cement made by the Cementium Patent Company, Limited, Tanner Street Bermondsey, S E It would appear to be a preparation of waterglass and silica, but it forms a solid joint, serving for the mending of almost any material except indiarubber vulcanite, and celluloid —"B J," June 11, 1909, p 456

Studio Mirror Accessory—A Iser has patented the use of a sheet of clear glass which is placed in a darkened portion of the studio at an angle of 45 deg to the opening of this darkened chamber The camera is placed to one side of the chamber, the axis of the lens being at an angle of 45 deg to the mirror The operator thus photographs the reflection of the sitter in the transparent mirror, whilst the sitter is able to view himself in the mirror, and cannot see the camera or the movements of the operator —Eng Pat No 3,763, 1909, "B J," June 25, 1909, p 502

Exhibiting Photographs in the Reception Room—A novel form of portfolio for holding and exhibiting photographs in the studio was shown by Oswald Weisser at the Dresden Exhibition. The portfolio made with an open hinged front, and contains a series of mounts taking seven or eight photographs, which mounts are similarly

hinged to the bottom of the case The latter stands of itself on a table, and the series of mounts can be turned down one after the

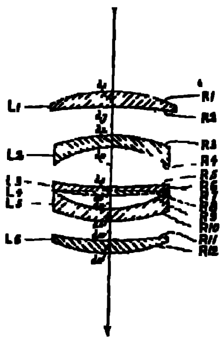


other when showing prints to a visitor, both sides of each mount being available for the purpose

Lenses and Photographic Optics.

The Regulation of the Rays in Photographic Objectives.—The Traill-Taylor lecture delivered by Dr E Wandersleb on this subject does not admit of condensation —"Phot Journ , Jan , 1909, p 4, and "B J ," Feb 15, p 116 and Feb 19, p 159 1909

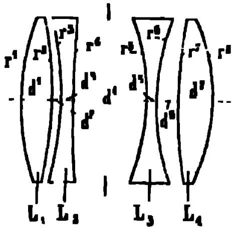
Five-Lens Anastigmat —Conrad Beck and Horace C Beck have further patented an improvement in the "Isostigmar" pattern of



lens ("B J A ," 1908 p 590), allowing of a larger aperture being obtained while still providing the corrections for astigmatism,

spherical aberration, chromatism, and coma. The general form of the lens is retained, but as shown in the drawing there is used, instead of the lens L2, a pair of lenses which may be cemented together, one element consisting of a negative lens of high dispersion and the other of a positive lens of low dispersion. By this means a lens is made with an aperture of approximately $f/4$, which will give good definition practically free from astigmatism over an angle of about 60 deg.—Eng. Pat., No. 14,673, 1908, "B.J.," Aug. 13, 1909, p. 634.

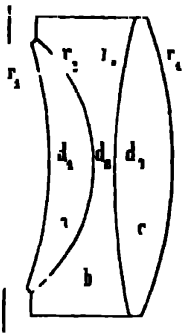
Four-Lens Anastigmat.—C. P. Goerz, A.G., has patented a construction of a four-lens objective composed of two pairs of lenses, each comprising a positive and negative lens, leaving between them an air-space in the form of a positive meniscus. In order to produce at a large aperture a high degree of correction, particularly of coma and spherical aberration, the refractive power of the negative lens in each of the two pairs of lenses is made smaller or equal to the refractive power of the positive lens in the pairs of lenses respectively, and at the same time the focal length of one half of



the objective formed by one pair of lenses is made at least twice as great as the focal length of the other half. By such construction of the objective from two halves, each of which exhibits, if examined for itself alone, considerable errors, it becomes possible to compensate the errors of the two halves, and to obtain an objective of increased perfection compared with that of Eng. Pat., No. 12,859, of 1898, in which the ratio of the focal lengths of the two halves is unity, and the halves are corrected spherically, astigmatically, and chromatically. According to the figures for radii thicknesses and kinds of glass, a relative aperture of $f/3.5$ is to be obtained.—Eng. Pat., No. 13,901, 1908, "B.J.," Jan. 1, 1909, p. 9.

Three-Lens Anastigmat.—The C. P. Goerz Company and W. Zschokke have patented an anastigmat consisting of a negative lens between, and in contact with, a biconvex lens of low dispersive power on one side and a positive meniscus on the other side, having lower dispersive and refractive power than the biconvex lens. The biconvex lens is formed of a kind of glass which has a higher refractive power than hitherto used, such refractive power resulting in a refractive index, n_D, of at least 1.615.

The effect obtained by this increased refractive power is due to the fact that the curvature of the contact surface between the negative lens of the objective and the biconvex lens is reduced in consequence of the increased difference between the values of the refractive indices of the negative and the biconvex lenses. The advantage of the reduction of the curvature of the contact surface is that the astigmatic aberration, if eliminated for a certain inclination of rays entering the objective, is at the same time eliminated to a higher degree for varying inclinations of rays than in the case of greater curvature of the contact surface of the negative and the biconvex lenses, as is found in construction described in Eng. Pats., No. 3,041, 1899, and No. 29,447, 1906.



An objective, in accordance with the invention, is represented in the drawing, where the three lenses forming the objective are designated a, b, and c respectively. The thicknesses of the three lenses are designated d_1, d_2, d_3 respectively, and the radii of curvature of the four lens surfaces are designated r_1, r_2, r_3, r_4 respectively.

The constructional elements of two embodiments of the new objective for a focal length 100 mm. are given in the following tables:—

Radii	Thicknesses	Kinds of glass		
$r_1 = -12{,}289$ mm.				
$r_2 = -4{,}989$,,	$d_1 = 1.343$	$n_D = 1.5102$	$n_{G'} = 1.5202$	$v = 64.1$
$r_3 = +22{,}111$,,	$d_2 = 0.584$	,, $= 1.5477$	,, $= 1.5609$	$v = 53.3$
$r_4 = -12{,}174$,,	$d_3 = 1.751$	,, $= 1.6169$	,, $= 1.6316$	$v = 53.8$
$r_1 = -13{,}889$,,				
$r_2 = -6{,}250$,,	$d_1 = 2.0$	,, $= 1.4649$	,, 1.4738	$v = 65.6$
$r_3 = -38{,}911$,,	$d_2 = 0.8$	,, $= 1.5164$	,, $= 1.5286$	$v = 54.1$
$r_4 = -14{,}117$,,	$d_3 = 2.1$	,, $= 1.6210$	,, 1.6349	$v = 57.1$

The improved objective can be used either as a single lens or as a doublet.—Eng. Pat., No. 13,902, 1908; "B. J.," Jan. 29, 1909, p. 87.

"Magnifiers" on the Telephoto System.—Dr H Harting has suggested the use of a very low-power telephoto lens (positive and negative lenses of equal focal length) to serve as an attachment for the front of an ordinary lens whereby objects at different distances may be brought into sharp focus without altering the extension of the camera The attachment amounts to the provision of a whole series of "magnifiers" by simply altering the separation between the negative and positive of the attachment, the focal lengths thus produced being equal to the distances of the object photographed The whole attachment may be fitted in a mount of the focussing type, care being taken that the mount is of such dimensions that it does not act as a stop and lead to vignetting of the image It is readily seen that cameras, such as those made for stereoscopic photography, for a plate of 107 x 45 mm, may be fitted with a pair of these focussing lenses, so that even when lenses of large aperture are employed focussing may be done for the foreground or distance For fitting to reflex cameras also it may be preferable in the case of a large lens to mount the latter in a fixed position, with its weight balanced on the camera front, and to provide focussing by means of the above described attachment The advantage of the suggested device lies in the fact that the same combination of lenses may be used for any objective, of whatever focal length so long as the respective diameters are suited to each other Also, in the case of lenses which already are fitted in a focussing mount, the use of the attachment allows of objects still closer to the camera being brought into sharp focus.—"Phot Rund," Heft 12, 1909, p 141, "B J," June 25, 1909, p 492

TELEPHOTO LENSES

Commercial Telephoto Work.—E A Biermann has shown the advantage of a telephoto lens in making a series of photographs of houses on a certain estate which was being offered for sale Owing to the undulating nature of the ground the natural picturesque surroundings of the houses could not be shown when a near standpoint was taken, as required by a lens of the normal focal length but by taking a more distant view-point a greatly improved a pect was obtained, and the two illustrations reproduced make the strongest possible case for the inclusion of a telephoto lens in the equipment of the photographer who would go out prepared to make the very best of a commission of this kind.—"T Q," June 1909, p 11, "B J," July 16, 1909, p 546

Practical Telephoto Work.—Captain Owen Wheeler, editor of the "Telephoto Quarterly," in a paper before the R P S, referred to the advantage of retaining one or two (moderate) camera extensions and obtaining different magnification by a series of negative elements Thus, with extension up to 15 ins, a series of negatives of 2¾, 2¼, 1¾, and 1¼ ins gives magnifications from 3¾ to 14 Captain Wheeler, among other hints, advised the use of a long hood to the lens, and the use of a yellow screen for cutting out atmospheric haze

In the discussion of the paper Mr Edgar Clifton described a ... of his for indicating the magnification being given by a

telephoto lens. A piece of white tape or of ribbon that will not stretch is taken, a ring sewn at the end of it so as to fit over any convenient screw in front of the camera, and, after finding out how far the negative projects into the camera, a series of divisions is marked off from that point, each of them equal to the focal length of the negative attachment It is convenient to begin at twice the focal length of the negative lens If, for example, the tape attached to the camera front shows the magnification to be three while the stop is $f/11$ we arrive at once at the working aperture of $f/33$ The most certain method of focussing is by means of the pinion on negative attachment If we focus by the separation of the negative and positive elements we hit the right point in the most unmistakable manner On the other hand, if the rack of the camera be employed, the depth of focus is such that one is never certain whether or not the best focus is obtained An important use of the telephoto lens, added Mr Clifton, is in making same size or nearly same size photographs of small objects When an ordinary lens is used it has to be so near that the object is shown in bad drawing, with a telephoto a more distant standpoint can be taken and the object photographed in proper perspective "Phot Journ," July, 1909, p 295

Telephoto Lantern Lens - K Martin calls attention to the advantages of the telephoto construction in lantern work In any lens made on the principle of the telephoto the nodes are some way outside the objective on the side of the positive combination If, therefore, we use such a construction in place of the ordinary lantern lens, and with the positive element nearest the condenser, a much greater distance is required between the condenser and projector This means that the light must be brought nearer the condenser to obtain even illumination, and this involves a consequent gain in light This is one of the advantages of using a long-focus projector, which many workers fail to realise Long-focus ordinary lenses have, however, the disadvantage of increasing the distance between lantern and screen This trouble is got over if we use a short focus lens of telephoto construction, with which the distance from slide to screen is not much greater than with an ordinary lens of the same focal length —Eder's "Jahrbuch," 1908 p 46, "B J," Jan 22, 1909, p 58

Telephoto Lens-Mount—Capt Owen Wheeler has patented the method of mounting the positive and negative elements of a telephoto lens in a way which dispenses with a solid tube between the two, and thus reduces internal reflections The negative element is carried at the end of a light removable framework built of a number (usually three or four) of strong metal wires or rods projecting into the camera from the inside of the front panel or from the mount of the positive element The positive lens mount is of the focussing type, actuated preferably by a small lever arm and screw movement to vary the separation of the two elements according to the magnification required and to the camera extension —Eng Pat, No. 20 415, 1908, "B J," Aug 6 1909, p 614

Cameras and Accessories.

Use of the Small Camera.—H. E. Corke comments on the advantage which can be taken of a small pocket camera (the focussing scale of which does not extend beyond about 6ft.) by using the instrument on a tripod and with the smallest stop in the lens. In this way objects much nearer to the camera than the shortest distance provided by the focussing scale may be satisfactorily copied and distant objects obtained on a larger scale by using the camera at its full extension and stopping down the lens. The illustrations show the practicable character of these suggestions.—"A. P.," June 8, 1909, p. 546.

A Clamp for Turntable Cameras.—When fixing a camera of the turntable pattern to a baseboard for copying purposes, the simplest and most efficient mode of attachment is by means of a flat brass bar long enough to fit over the baseboard of the camera, under the bellows, and in the centre of it riveted a screw boss to take a camera screw. The bar is only long enough to rest on the upper edges of the turntable ring, while the underside of the boss is nearly flush with the bottom of the turntable. The camera is put upon the support arranged to receive it. The bar is dropped in over the turntable, and then a camera screw passed through the support and screwed tightly into the boss holds everything as firm as can be wished. The contrivance fulfils its purpose perfectly, and can be carried about quite easily in the pocket.—"B. J.," June 11, 1909, p. 450.

REFLEX CAMERAS.

Reflex Cameras.—No. 99 of "The Photo-Miniature" is devoted to the advisable features of reflex cameras, the methods of reflex photography, and the movements of existing patterns of reflex cameras. (See also "B. J. A.," 1909, pp. 526 to 542.)

Folding Reflex Camera.—A patented form of folding reflex, according to the specification of J. Frennet, is described in "B. J.," Sept. 10, 1909, p. 709.

Types of Reflex Camera.—Reflex cameras may be divided into two classes:—(*a*) those in which the mirror rises by a spring on the shutter release being pressed, the shutter being at the same time released and the mirror remaining up after the exposure, and (*b*) those in which the mirror is raised by hand into the up position when continued pressure on the lever actuates the shutter. The mirror then falls again by its own weight. Instruments of pattern *a* have the advantage that the camera can be used upside down when held above the head in photographing when there are obstacles in front. The release is also more smoothly made in this pattern, and there is the further advantage that the interval between pressure on the release and exposure of the plate is constant, as it depends on the mechanism of the camera and not on the

quickness with which the release is pressed. The drawback to the *a* pattern is that the plate is left covered only by the blind of the shutter, and, if the latter is not a self-capping one or is not automatically locked until the mirror is put down, a plate may at times be accidentally fogged by re-winding the shutter before putting down the mirror.—"B J," June 11, 1909, p 451.

Full-Size Focussing Cameras.—J Gaut and Harrington and Company have patented a construction of camera in which the image is viewed on a white opaque surface placed slightly in front of the focal plane, and viewed through an aperture or eye-piece in the front part of the camera. One single release raises this focussing screen, at the same time moves the lens backwards so as to bring the sensitive plate into the focal-plane and actuates the shutter. (Compare the patent of Thornton, "B J A," 1909, p 554.) Eng Pat No 7 512 1908.—"B.J," Mar 5, 1909, p 181.

Stereoscopic Cameras and Accessories.—See under "Stereoscopic Photography" in section "Photographing Various Subjects."

INSTANTANEOUS SHUTTERS

Testing Shutter Speeds.—E A Salt describes and gives constructional details of a very practical form of the shutter measuring camera in which an image of an illuminated slit is received on a

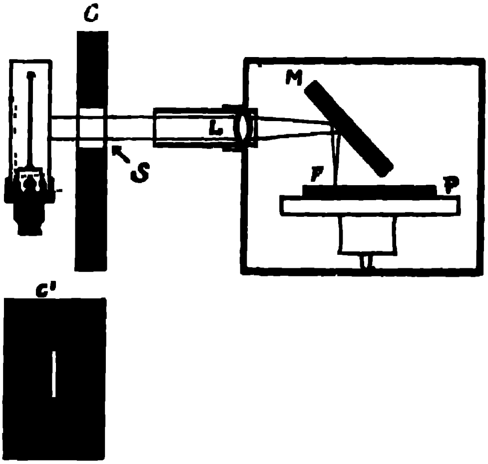


Fig 1

plate rotating at known speed. The apparatus records durations of exposure down to about 1/100th sec, and indicates the efficiency of the shutter tested. Fig 1 is a diagram of the complete apparatus

On the right is a light-tight box or camera, fitted with a lens, L, in sliding tube for focussing On the left is seen, in side and front elevation, a board C C', behind which is an incandescent burner illuminating a slit, S This illuminated slit is focussed on a dry plate, P, by means of a surface-silvered mirror, M, set at an angle of 45 deg The dry-plate is supported on a carrier capable of rotation at definite speed The shutter is placed in front of the slit On the release of the shutter a point of light is first recorded on the rotating plate, F, broadening into a circular band representing full aperture, and tailing off again into a point on the completion of the exposure By applying the developed plate to a home made protractor on glass, secured by copying a drawing in the camera, the number of degrees covered can be read off, and deducting the width of the slit image the duration of exposure is ascertained The efficiency of the shutter can be closely arrived at by noting the number of degrees occupied in opening and closing and in the period of full aperture

A special spring motor, sold by Messrs George Adams and Company for driving gramophones, is used to rotate the plate, which is rigidly held in a carrier of simple design At two revolutions per second (the speed adhered to) the motor runs with great accuracy The mirror can be swung into a horizontal position to permit removal of the plate carrier underneath The camera is divided horizontally into two compartments to prevent leakage of light, the mirror and plate carrier occupying the upper part the motor the lower Both sides of the camera are removable A dry-cell, the current from which passes through a contact fixed to the motor spindle, actuates a small magnet and armature, and gives an audible tap at each revolution A pencil inserted through a guide allows of a circle being inscribed on the plate and of its being subsequently centred on the protractor Several records, six or more, can be taken on one quarter plate, according to the scale desired The slit image is recorded on the plate when stationary so that its width may be deducted from each reading The camera and slit carrier are provided with rising fronts, the amount of rise being indicated by scales Speeds of half a second and longer can be recorded if necessary by slightly lowering the camera front when an exposure is being made Provision is made for employing slits of varying lengths, the shutter being held close thereto by an adjustable carrier The camera and slit carrier are mounted on a baseboard on which the former slides

A reduced copy of the protractor used is shown in Fig 2 In order to avoid crowding it is divided into 125 divisions only In practice each division is read as representing 4 degrees With the motor revolving twice a second each degree will therefore indicate 1/1,000th sec

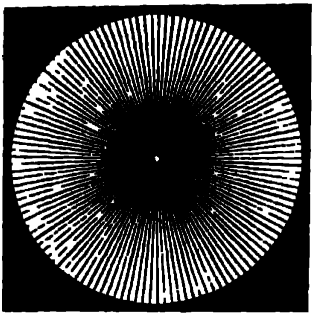


Fig 2

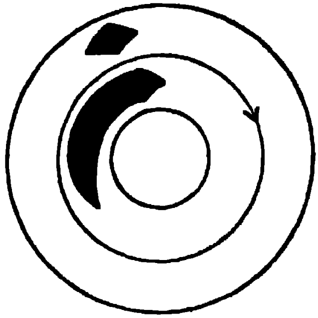


Fig 3.

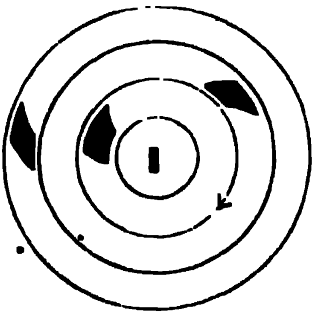


Fig 4

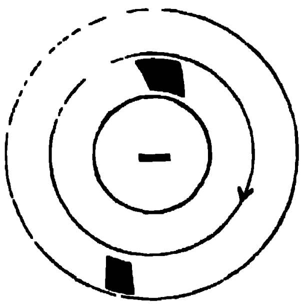


Fig 5

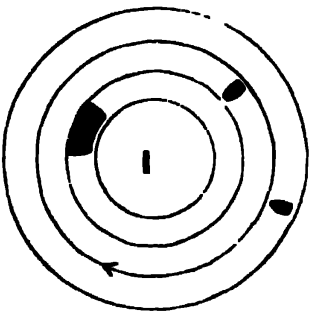


Fig 6.

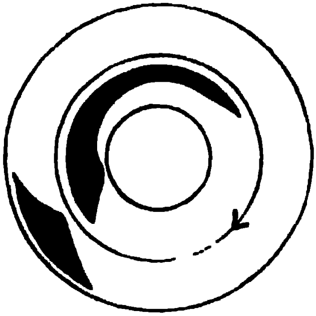


Fig 7

The foregoing are some typical diagrams of representative shutters on the market. In all the beginning of the curve representing the opening of the shutter points in the direction of rotation indicated by the arrow head, slow speeds being taken towards the centre, and vice versa.

Fig. 3.—Iris shutter. No period of full opening at highest speed.

Fig. 4.—Messrs. Beck and Co.'s "Celverex" shutter. System diaphragmatic; spring tension constant; reduction of aperture in rotating disc, to obtain proportional variation in "durations."

Fig. 5.—Thornton-Pickard roller-blind shutter, 1⅝ ins. One inch slit used.

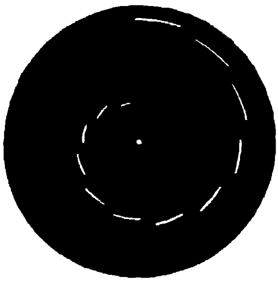
Fig. 6.—Messrs. A. E. Staley and Company's diaphragmatic (three bladed) "Compound" shutter.

Fig. 7.—Messrs. Emil Busch and Company's before-lens "Foreground" shutter. A blade lifts and descends. The portions away from the centre represent proportional exposures to the foreground.—"Phot. Journ.," Mar., 1909, p. 170; "B.J.," Apr. 9, 1909, p. 282.

Diaphragm Shutters.—As mentioned in the above paper by Mr. Salt, while with a blind shutter a reduction of the stop leaves the efficient exposure exactly the same, with the iris shutter the efficient exposure increases as the stop is reduced. This has an important bearing on the use of the stops, though that fact may not be quite apparent at first sight. So long as the efficient exposure remains the same the stops preserve their ordinary value, but if the efficient exposure changes then the stops change their value as regards intensity. Suppose we consider the case of an iris shutter working at an efficiency of one-third when set to a high speed. Assume its full aperture to be equivalent to $f/5.6$. Then with a lens aperture of $f/11$ the efficiency is increased to two-thirds, or is doubled. In the ordinary way a reduction of aperture from $f/5.6$ to $f/11$ reduces the intensity of the light to one-quarter, but as in this case it has doubled the shutter efficiency the light intensity is only halved. If this fact is not known it is certain that the photographer will assume that by opening out his lens stop from $f/11$ to $f/8$ he doubles the exposure, and probably not one in a hundred ever realises that it is necessary to open out to $f/5.6$.—"B.J.," Mar. 5, 1909, p. 174.

Measuring Shutter Speeds.—Paul Thieme has described a method of measuring shutter speeds by means of a rotating disc in which are a number of slits of different lengths cut concentrically in the disc, so that on the latter being rotated and viewed through a horizontal slit a series of successive equal light impressions are obtained from a source of light placed behind the disc. This arrangement, which is shown in the two figures, allows of the apparatus being used both for diaphragm and focal-plane shutters.

The apparatus is adjustable to speeds of various degrees by increasing or reducing the speed of the disc.—"Phot Mitt," Heft



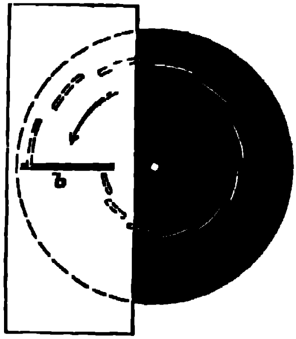
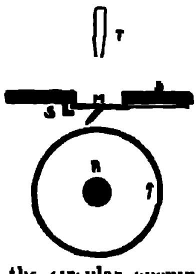


Fig 1 Fig 2

9 and 12, 1909, pp 133 and 180, "B J," May 21, p 397, and June 25, p 453, 1909

Birkhauser's Apparatus —A device, similar in principle to that of Thieme's above described, is used by Dr R Birkhauser, who employs for the revolution of the disc a weight attached to the pulley, so that on being allowed to fall it completely detaches itself from the pulley and leaves the disc rotating at a uniform rate Drawings showing the method of perforating the disc, and also specimen records obtained are given in "B J," July 9, 1909, p *535 The apparatus serves for measuring both diaphragm and focal-plane shutters, and also for recording the rapidity of combustion of flashlight powders

Pneumatic Method of Measuring Diaphragm Shutters W H Smith has devised the following method T is a tube adjustable up and down out of which a gentle current of air is flowing B



is a thin board having the circular opening shown M is a mica disc, attached to one end of the board by means of a flattened watch spring, which has just sufficient force to allow the disc nor

mally to close the opening On the underpart of the disc, M, is fastened a small camel hair brush, charged with aniline dye solution S is a stop to limit the action of the disc R is a drum rotating at known speed, around which is wound some white paper

The shutter to be tested is placed over the aperture in the board, and the pipe brought down centrally Air is turned on, either by blowing into the tube, or in any other convenient way, and the shutter released. The mica disc is instantly depressed, and the brush leaves a recording streak on the rotating paper indicating the duration of exposure —" Phot Journ ," Mar, 1909 p 170, "B J," Apr 9, 1909 p 285

Artificial Light.

Arc Lamp Reflectors.—The reflectors of arc lamps are apt to become very discoloured after a time, and so the efficiency of the light is considerably impaired To whitewash them, however, is not of much use, as the heat soon causes it to crack off, and most white paints are not very good, they soon yellow badly The best medium for this purpose is the "Olsina" white water paint sold by Messrs Minder Bros, which, applied thinly after it has been reduced with water to a suitable consistency, withstands the heat and keeps its colour well —" B J, Jan 29, 1909, p 86

FLASHLIGHT

Flash Powders.—Dr G Krebs has patented a non explosive mixture, giving a flashlight with very little smoke, the basis being magnesium or aluminium powder, anhydrous copper sulphate or chrome alum e g, chrome alum and magnesium powder, equal parts, or copper sulphate, anhydrous, 6 parts, magnesium powder 3 parts aluminium powder, 1 part This gives much less smoke than mixtures containing chlorate, and the smoke passes away rapidly, so as to allow of a series of successive exposures in a room —Ger Pat, No 205,498, of July 26, 1904, from "Chem Zeit," Repertorium, No 16, 1909, page 68, "B J," Feb 12, 1909, p 127

Thorium Flash Powders.—Carl Bethge uses insoluble, or nearly insoluble, metallic salts of thoria in conjunction with magnesium or aluminium metals as a rapid or slow flash powder The compounds of thoria with acids or heavy metals which are found most suitable are the chromate and the tungstate The chlorate and perchlorate are also found suitable The nitrate, on account of its acid reaction and hygroscopic nature, is unsuitable for a flashlight powder, even when put up separately from the magnesium powder, since under these conditions the salt cakes together Chromate of thorium in the two forms, one containing some water of crystallisation, the other none, both produce a very rapid flash (difference from chromate of cerium) A suitable formula for a flash powder

is 30 to 35 parts of magnesium powder mixed with 70 parts of thorium chromate. For a slow burning powder 1 part of magnesium is mixed with 2 parts of thorium tungstate. Salts of peroxide of thorium may be produced by precipitating nitrate of thorium with hydrogen peroxide in a solution containing also the acid which it is desired to combine with the thoria. Thus a solution of thorium hydroxide in perchloric acid gives a gelatinous precipitate of perchloride on addition of hydrogen peroxide, heating the solution to 140 deg. F. and rapidly cooling. This compound forms a white, brittle, glassy mass, which is easily powdered, and keeps well in the air. It does not cake, and may be easily mixed with magnesium.—Eng. Pat., No. 14,692, 1908; "B.J.," Mar. 12, 1909, p. 202.

Slow Burning Flash Powders.—C. Bethge has patented the making of a slow-burning magnesium powder or time light, the principle of which is the use of the oxide of a rare-earth metal with magnesium powder, this latter in quantity at least three times the chemical equivalent of the oxygen in the compound of the rare-earth metal. On combustion of a mixture of this kind there is repeated reduction and re-combustion of the oxide of the rare earth metal. The excess of magnesium may be anything up to 10 times the equivalent of the oxygen in the other compound. Suitable formulæ for these slow burning flash powders are as follows:

Magnesium powder, 5 parts; [illegible], 3 parts.

Magnesium powder, 250 parts; [illegible] oxide, 150 parts; vanadic acid, 8 parts.

Magnesium powder, 5 parts; [illegible] oxalate, 2 parts.

Magnesium powder, 5 p[illegible] cerium oxide, 1 part; hydroxide, 1 part.

Magnesium powder, 5 parts; manganese oxide, 1 part.

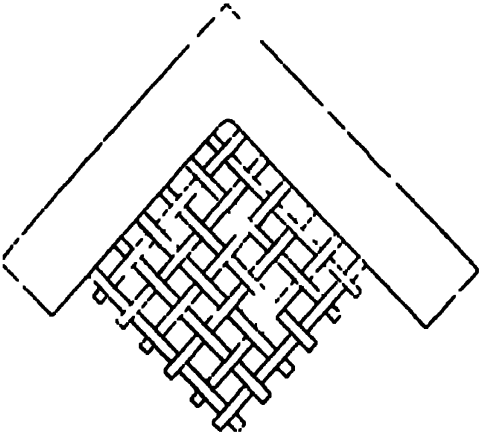
Magnesium powder, 10 parts; cerium oxide, 2 parts; man[illegible] oxide, 1 part.

The average time for the combustion of 2 to 3 gms. of the above mixtures will be 30 seconds.—Eng. Pat., No. 1[illegible],448, 1908; "B.J.," Sept. 10, 1909, p. 710.

Electric Firing of Flashlight.—F. E. Keller gives drawings and instructions for making an electrical igniter for firing flashlight powders, which method he has found to be the most certain in practical work. The igniter is used with a battery of eight dry cells.—"Photo Era," Apr. 1909, p. 183; "B.J.," Apr. 16, 1909, p. 308.

Magnesium Ribbon Sheets.—G. W. B. recommends making magnesium ribbon into a net of coarse mesh for convenience in burning and production of more even illumination when, say, using the ribbon

in enlarging Two L-shaped frames are made in thin sheet tin or aluminium (See figure) The free ends of the strips of ribbon are then fastened in one of the L-shaped pieces by pasting a strip of



paper over them, the other frame being clamped on top The lower free corner of the network may then be lighted, and the whole will burn about as fast as a piece of paper - 'Cam,' Feb 1909, p 60, 'B J, Feb 26, 1909, p 159

III.—PHOTOGRAPHING VARIOUS SUBJECTS.

Portraiture.

Fireplace Accessory for Firelight Portraits by Daylight L. Kellogg in producing by daylight portraits having the effect of firelight, as described by H E Corke ("B J A 1908 p 601), makes use of an imitation fire-grate placed before a half open window and fitted with a pair of mirrors, one of which, 1, reflects

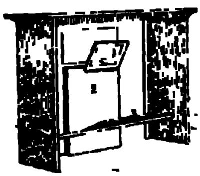


Fig 1

Back View of Fireplace Accessory

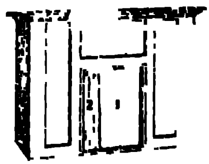


Fig 2

Front View of Fireplace Accessory

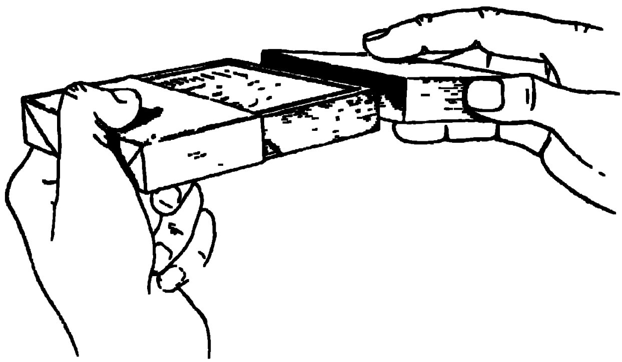
the light on to a second mirror, 3, from which it is reflected through the front of the accessory which is covered with a thickness tracing cloth, 2 —"St L & C Phot Feb , 1909, p 97

Photography on Tour.

Hand-Camera Shutter and Exposure-Meter —W Booth has patented a mechanism whereby the adjustment of the iris diaphragm of the lens is made in accordance with the subject to be taken, the shutter being set in accordance with the reading of an actinometer The two adjustments are intended to provide for the correct exposure of the plate without calculation, but it is necessary for this purpose that the plate should have a sufficient (usually a very high—Ed "B J A") degree of sensitiveness Eng Pat No 28,185, 1907, "B J A" Jan 29, 1909, p 88

Repacking Plates Exposed on Tour —W Thomas points out that when plates are to be repacked after exposure in the box from which they were taken the neatest way of removing the outer

wrapping is to cut it round with a penknife across the centre of the package, as shown in the figure In repacking, all that is necessary is to replace the two halves of the cover, when a piece of adhesive paper such as used for binding lantern slides or passe



partouts, stuck round where the cut was made will join both cover parts together, and the plates are as secure and safe from injury as when first received from the makers —"B J " May 28, 1909 p 421

Numbering Exposed Plates —H C L recommends writing on the corner of the exposed plate with a fine-pointed steel or a pointer of any metal, or even bone The pressure effect is rendered visible by the developer, the writing appearing black —"Bull Phot " Mar 31, 1909 p 200

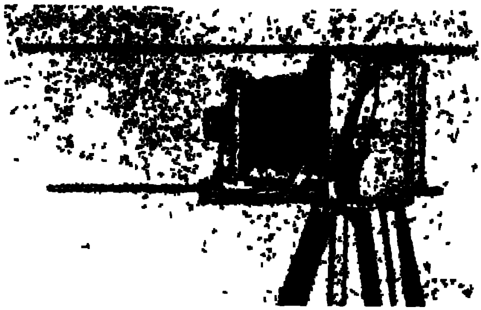
Miscellaneous Subjects.

Street Snapshots After Dark —H Wild, using backed Wratten "Panchromatic" plates and a Dallmeyer portrait lens of *f*/4, has succeeded in taking some very effective views of street scenes in the West-end of London lit only by arc lamps The exposures were about one second, and plates were developed with pyro metol (Imperial formula) made up with 1 part No 1, 2 parts No 2, and 1 part of hot water to bring temperature up to 75 deg F The focus of the lens was 8½ ins, which in a quarter-plate camera enforced a somewhat distant standpoint from the actual subject, an advantage in securing the photographer from close observation The results enlarged to 15 by 12 showed ample definition and satisfactory freedom from grain —"Phot " Mar 16, 1909, p 207

Stop to Use in Night Photography —H Wild, in taking street scenes by night where arc lights occur in the picture, states that the good rendering of the lights (freedom from reversal) appears to depend on the actual time the plate is exposed without reference to

the aperture of the lens Supposing that no more than ten minutes may be given at $f/11$, it is found that at $f/8$ about the same time can be given, and very little more than that at $f/16$.—"Phot.," Aug 24, 1909, p 153

Photographing Insects.—In a paper on a new form of stereoscopic camera (see "Stereoscopic Photography") Dr W Scheffer describes an attachment for use in making instantaneous exposures of insects on a large scale (full, half, or one-third size) The arrangement is described as being more convenient and equally as



Showing camera set for reproduction, same size.

Showing the camera set for focus half scale

accurate as a reflex camera On the upper-left and lower right-hand corners of the camera a metal groove is fixed in which a steel rod can move On these rods, marks corresponding to the 1 1, 1 ½, and 1 ⅓ markings on the body of the camera are made, and the photographer, therefore, has nothing further to do than to bring

the focussing adjustment and the marks on the rods into correspondence The camera is held so that the object being photographed lies exactly between the rods The image will then be sharp and the object will lie in the centre of the image This arrangement can also be applied to any of the "Palmos" stereoscopic cameras provided that it has an automatic lens board — "Phot Rund," Heft 3, 1909, p 29, 'B J,' Feb 19, 1909 p 135

Copying.

Copying Prints Wet—Dr D'Arcy Power recommends copying a bromide print while wet in order to secure better details in the shadows The print is squeegeed under water in contact with a glass plate the surface of the latter dried and polished, and placed before the camera under an oblique lighting, so that reflections are thrown away from the lens Even illumination is secured by a mirror placed at an angle to the case on the side opposite the light If the print has to remain so long on the glass that it may dry it may be backed with a piece of rubber sheeting "Cam Craft," Feb, 1909, p 60

In Reproducing Pencil Drawings it is sometimes found that the ground photographs very mottled This is due to the yellow colour of the varnish used by the artist as a "fixative" for pencil and charcoal work If this trouble is encountered, wet plates should not be used but a panchromatic plate, which will generally photograph the ground evenly without any filter If a filter is needed, then only a light yellow one is necessary — 'B J," Jan 29, 1909, p 86

Masking the Original—A useful dodge when copying an original consisting of, say, a design embodying a water colour sketch is mentioned by R Earle In order to prevent over-exposure of one portion when the other was correctly timed, a hole was cut in some orange paper with a sharp knife and a glass plate as a guide, so that it exactly fitted the water-colour, and the paper was then laid down on the design with the water colour showing through the hole In this condition an exposure of thirty minutes—which experience had shown to be about right for the water-colour—was given The paper was then removed, without disturbing the other arrangements in the slightest, and a further exposure of two minutes was given to the whole design The result proved to be quite satisfactory Black paper or black velvet would perhaps have answered better, but the orange paper was handy, and seemed to do all that was needed —"Phot," May 11, 1909, p 382

Photographing Finger-Prints—H Nolan gives the following methods of service when photographing finger-prints taken upon different surfaces

1 Finger-prints in dust
   (*a*) On colourless glass, illuminate by transparence with oblique light dark background

(*b*) On dark surfaces (a very easy subject), illuminate by direct light

2 Finger-prints in grease (ordinary finger-prints)

(*a*) On light surfaces such as china plates, dust on (dry) very fine graphite powder, blow off with bellows, etc, *not with breath* The "dusting on" is best effected by charging a heavy flat-ended camel-hair brush with the powder, holding it near the surface and jerking it by a blow on the hand which is holding it

(*b*) On dark surfaces, such as the black or green paint of a safe, mahogany furniture, etc treat similarly, using fine, dry whitelead powder

(*c*) "Invisible" finger-prints on paper Develop with aqueous solution of silver nitrate (5 to 8 per cent)

3 Finger prints in blood on dark surfaces (e g, black bottles) In dark room illuminate by direct rays of arc or magnesium light, preferably concentrated One may get reflections, but the pattern of the papillary ridges will stand out clearly

"B J," July 23, 1909 p 583

Copying Burnt and Faded Documents—Dr R A Reiss, in a paper describing his method for deciphering by photography inscriptions on documents which have faded with time, or have become partly destroyed by fire, states that in the former case the document is photographed by aid of as powerful a light as possible, direct sunlight or the light of an arc lamp A faded inscription usually takes the form of faint yellowish markings in the document, and these may be brought out by using a blue filter of copper sulphate solution (to which ammonia has been added) contained in a glass cell The use of a printing paper such as "Carbon" Velox, or the special "Rembrandt" paper allows of these faint records being further intensified, whilst in some cases it is well to enlarge direct from the original, using the blue filter and developing slowly with ferrous oxalate Repeated reduction and intensification of the negative is also a valuable method, as is also the making of reproduced negatives in the camera and a positive transparency At each of these steps a higher degree of contrast may be obtained

When treating documents partly destroyed by fire the burnt paper is first rendered less fragile by spraying it (with an atomizer) with fixative, such as is employed for fixing crayon and pastel drawings A suitable preparation is that of Dr Schoenfeld and Co of Dusseldorf This allows of the burnt paper being spread out flat on glass by aid of a couple of small soft brushes, after which it is pressed flat between two glass plates in a printing frame and copied in the camera In making the negatives from it similar methods to those above described are employed

In making copies of a burnt paper on which writing had been done in pencil the following method has given good results —The original is laid on a horizontal copying board or, if it has become crinkled, is pressed in a printing frame, in either case the surface

is placed at an angle of about 60 to 65 deg to the axis of the lens The lighting is provided solely and only by an incandescent gas burner provided with a reflector This burner is placed to the side of the original remote from the lens so that the rays fall upon the surface at an angle of about 30 deg A yellow sensitive plate is used The rays are reflected by the inscription, and the latter can sometimes be faintly seen on the focussing screen In the negative the inscription is thus obtained in black on a more or less transparent ground A very protracted exposure requires to be given —"Bull Belge," Apr, 1909, p 152, "B J" July 9, 1909, p 533

Adjusting Plate and Original Parallel —Douglas Carnegie has devised the following apparatus, which he terms a "parallelizer," for ascertaining that the focussing screen or plate is in proper parallelism with an original, such as a painting, which is being copied away from the studio The apparatus is made as follows

At one end of a bar of wood 10 ins long and 1¼ ins broad seven pins (P) are fixed in vertical positions, one eighth of an inch apart from each other (Fig 3) A peep-hole (S), made by boring a hole one twentieth of an inch in diameter in a piece of sheet zinc (Z), is affixed to the other end of the bar If the refraction of the observer's eye is not normal a lens of suitable power and sign must be fixed centrally over the peep hole

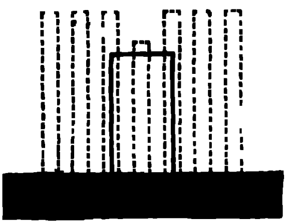


Fig 1

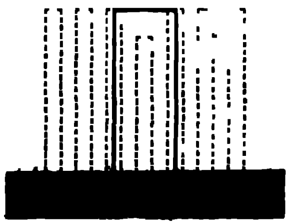


Fig 2

Fig 1 —Appearance when the parallelizer is adjusted in azimuth, but not in altitude (Full line represents the central pin, dotted line represents the mirror images of the pins)

Fig 2 —Appearance when the parallelizer is adjusted both for azimuth and altitude

The side of the zinc plate facing the pins should either be painted dead black or covered with black velvet The pins used are of the large size (1-20th in diameter) known as "blanket pins" The points and heads of the pins are cut off so that inch-and-a-quarter lengths of uniform diameter are obtained, and the ends are smoothly filed off at right angles to the longitudinal axes By means of a saw of slightly narrower cut than the diameter of the pins, shallow slots are made in a small strip of wood at intervals of one-eighth of an inch The pins are pressed into these slots, and another flat strip of wood is screwed on to the slotted piece, so as to bind the pins

securely in position Before screwing up tight care must be taken that the tops of the pins are in accurate alignment The pin holder (H) is now nailed to the end of the bar, and for purposes of easy identification the top half of the central pin is painted black on the side away from the peep-hole, the whole of the portion of the central pin facing the peep-hole being left bright The bar itself is now mounted on a tripod by means of a small ball and socket head, such as can be purchased for a shilling

Suppose the object to be photographed is a picture (P), inclined to the vertical wall on which it hangs (Fig 4) The camera (C) (which should also be mounted on a substantial ball-and-socket head) is set up in front of the picture at such a distance as to give the desired scale of reproduction It is adjusted so that the focussing

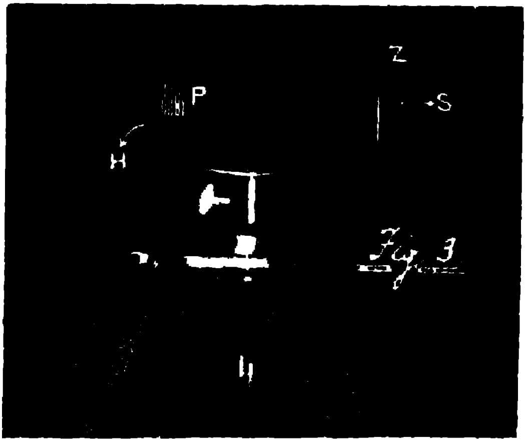


Fig 3

screen is as nearly parallel to the picture-plane as can be judged by the eye The picture is centred and roughly focussed The lens is now unscrewed from its mount, and the focussing screen removed from the back of the camera The paralleliser (HZ) is set up as close behind the camera as is consistent with good illumination of the pins, and its line of sight is directed along the axis of the camera A small piece of patent plate mirror (M) (1-16th in thick) is stuck flat on the glass of the picture by application of wads of soft wax at the corners If the picture is not glazed the mirror must be held up against the picture surface by an assistant

On looking through the peep-hole of the paralleliser the pins and their virtual mirror images will be seen The paralleliser is now turned in azimuth (laterally) till the central pin centrally overlaps

its mirror image, the latter easily recognised by its appearing shorter than the images of the other pins, owing to the black paint with which its upper front half has been treated (Fig 1) The paralleliser is then turned in altitude (vertically), so that the top of the central pin is in perfect alignment with the tops of the images of the other pins (Fig 2) The focussing screen is now replaced, a piece of mirror affixed to its hind surface, and (the ball joint of the camera having been loosened so as to move smoothly when gently urged) the camera is adjusted on its head till a similar coincidence and alignment to that just described is again obtained on looking through the peep-hole at the focussing screen mirror

The plane of the screen must now, of course, be parallel to the

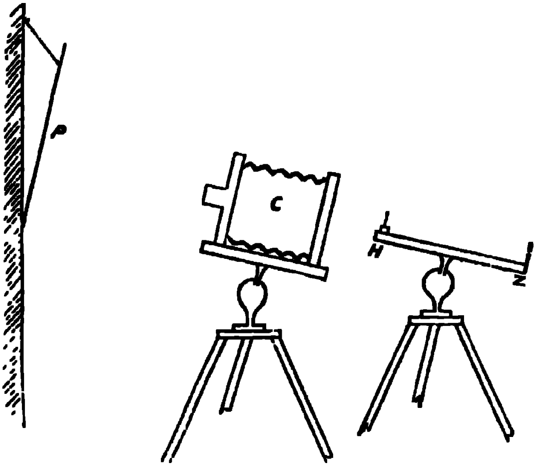


Fig 4

picture plane The lens is replaced in its mount, and the picture is finally and critically focussed

The advisability of using a camera and plate of larger size (e g, of using a half plate for the production of a negative of quarter-plate size) will be clear, for if in the preliminary focussing the image just filled the screen, the final adjustment with the paralleliser would result in throwing some of the image off the plate altogether It is also advisable that the camera be of the front focussing type — "Photo Notes," May 14, 1909, p 87, "B J," May 14, 1909, p 377

A further device for the same purpose is described by Montagus Troup as follows —A white metal tube, 6 ins long, 1¼ ins in diameter and not less than 1 16 thick is fixed at right angles to the centre of a piece of blackened board 6 ins square and 1 in thick

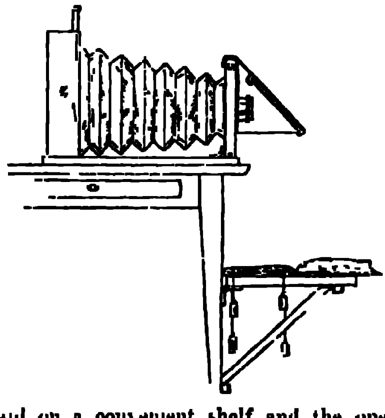
To each corner of the board a piece of narrow tape is attached, and this completes the apparatus For the sake of portability the tape is made detachable, fitting over a short piece of inner tube permanently fixed to the board

To use the instrument it is placed against and in contact with the object to be photographed, as near the centre as possible, and the four pieces of tape are fixed with pins to the edge of the frame or board, stretching them tightly, so that the tube stands at right angles to the object The camera is then set up and the image brought to the size required

On looking at the screen the instrument will show as a white tube with a black centre, standing forward on a black border.

As long as the screen in the camera is not truly parallel to the object we shall see the white tube elongated on one side, but as soon as the camera and object are truly parallel the front edge of the tube will show as a true white circle, with a black centre and black background The entire operation is very simple and takes no time to complete, while the instrument can be made out of the simplest materials —"Photo Notes," June, 1909, p 105

Copying in Libraries.—J Fassbinder points out the use which can be made of negative copies on bromide paper (white lines on black ground) of documents, printed books, etc , in libraries The camera is fitted with a reversing mirror which allows of the original



being simply laid on a convenient shelf and the open page kept flat by weighted lengths of silk With practice, six exposures may be made in ten minutes inclusive of reloading the six dark slides - "Phot Mitt ," Heft 13, p 195, B J ," July 9, 1909, p 537

Contact Copies of Plans, etc—E E Fournier d'Albe has independently rediscovered the method of J H Player, by which copies of plans, etc , which may be opaque and printed on both sides are copied by placing a sensitive material, sensitive side in contact

with the plan, and exposing to light through the sensitive plate or paper. The image thus obtained is formed by the different reflective powers of the parts of the plan. Mr. D'Albe calls the process "anastatic photography," and describes the various ways in which it can be carried out with photographic plates or papers. For plates a developer, both giving contrast and acting quickly, is best—e.g., hydroquinone in conjunction with caustic potash, or 1:15 rodinal. The exposure for the latter should be rather longer. The normal exposure to light is that which would be required to make a positive transparency from an average negative on the same kind of plate. The latter should be of the "photo-mechanical" type, on account of the greater contrast. The fog which is also produced is removed by short use of a strong reducer, such as Farmer's. It is best to make a rather weak impression in the first instance, and let it develop right down to the glass. The requisite contrast can also be obtained by making a second negative from the first.

Applying the "anastatic" method to carbon printing, a gelatine film on a glass plate (a fixed and washed dry plate) is sensitised in saturated solution of potass bichromate and allowed to dry in the dark. It is placed with the film in contact with the drawing and exposed through the glass for about thirty minutes in diffused daylight. Here the soluble parts on the surface, and necessity for transfer is obviated. A plate perceptible relief is obtained. If a negative is wished the plate developed in a mixture of water and Indian ink.

A positive direct from the drawing is produced by using a dry plate soaked for five minutes in 10 per cent. potass bichromate solution. This is exposed as before by daylight, and developed with dilute rodinal. Here the bright portions of the original make the gelatine more insoluble than the dark portions. The latter therefore absorb the developer and produce a blackening of the silver salt contained in them. The positive may be fixed in hypo in the usual manner.

Printing-out paper does not prove successful with the "anastatic" method.

The bleach-out action of light on primuline may be employed. Gelatine-coated plates or papers are soaked in primuline solution and sensitised in—

Sodium nitrite	100	7.6 gms.
Hydrochloric acid	½ oz.	16.5 c.c.
Water	30 „	1000 c.c.

This gives a reddish brown film, which, after washing and drying, is exposed in contact with the original as before, and gives a positive direct.

A similar bleach-out process is that based on the exposure of paper sensitised with ferric chloride and oxalic acid. This gives yellow lines on white ground, and the copy is then used as it is for making a negative on bromide paper, or, instead of thus printing, the copy may be developed with citric acid and alum (1 part of each) dissolved in water (85 parts), in which the print is immersed

to give a black image with the ferric salt, thus giving black positive copy of the drawing

The author has devised a printing cabinet, serving for the making of copies from originals, such as illustrations in books, etc, which are somewhat awkward to handle —"English Mechanic," Apr 30, p 287 May 14 p 335, May 21, p 359, and May 28, p 383, 1909

Stereoscopic Photography.

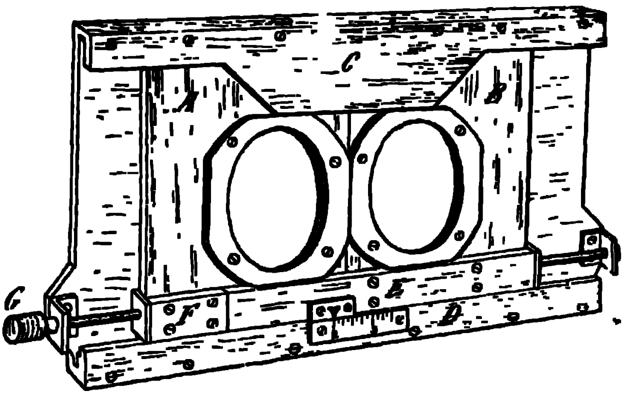
Commercial Stereoscopy —A description (from "American Industries") of the machine methods of turning out large quantities of stereoscopic prints and some notes on the industrial uses of the prints appear in "B J Apr 30, 1909 p 346

Automatic Stereoscopic Camera — A type of camera for stereoscopic work which may be suggested to camera makers is one in which the adjustable front is made to work automatically with the focal extension of the instrument, a greater separation being thus imparted to the lenses as the camera is racked out in focussing near objects If properly adjusted the principal object in view will always be represented in the centre of each of the separate stereo images, so that when using ordinary stereo size plates the maximum separation for distant objects should be 3¼ ins The production of a half full size image will then require the separation to be reduced by one-third, that is, to about 2 ins, which is generally the least separation that can be arranged with lenses of ordinary size Larger images than this will seldom be required The rule governing the amount by which the separation must be diminished as the camera is racked out is a very simple one If the additional extension of the camera beyond the infinity mark is equal to the focal length multiplied by $\frac{1}{r}$, then the separation must be reduced by an amount equal to the maximum separation multiplied by $\frac{1}{r+1}$. That is to say, when making a quarter full size image we must reduce the separation by one fifth, or when making a one-sixth full size image we must diminish the separation by one seventh, which is nearly half an inch if the original separation is 3¼ ins The automatically adjusting front will render mistakes impossible, and greatly diminish the trouble of setting up the camera —"B J," Dec 11 1908 p 937

Focussing and Separation of Stereo Lenses by one Automatic Movement —A camera on the lines suggested above is described by Dr W Scheffer as having been in course of working out since a date prior to February, 1908 The two stereoscopic lenses are placed in sliding panels each connected to a two-armed lever The lower extremities of these levers move in a pair of straight grooves inclined at an angle to each other, the grooves being made in metal and fixed in the ordinary baseboard of the camera The further the lens board is racked out from the ground glass the further the lower extremities of the levers are separated from each other and

therefore the nearer the lenses are brought together.—"Phot Rund." Sept 3, 1909, p 29, "B J." Feb 19, 1909, p 135

Adjustable Stereo Front —A new design of lens panel allowing of the pair of stereoscopic lenses being used upon it at a separation (from centre to centre) of from 2 ins to $3\frac{1}{2}$ ins has been made by providing a straight bellows between the two separate panels carrying the lenses The folds of the bellows, which is made of roller blind material, are $\frac{1}{4}$ in wide, and are perforated so as to run along two guiding wires Their edges are protected at the back by thin metal flanges, which overlap the bellows by about 1 in, and in front by the slips that hold the sliding panels A right-and-left screw actuates the two panels A and B are the two lens panels, connected together by the straight bellows H C and D are guide strips that hold the panels in place, while F and E are strips protecting the right and left screw G F is fixed to panel

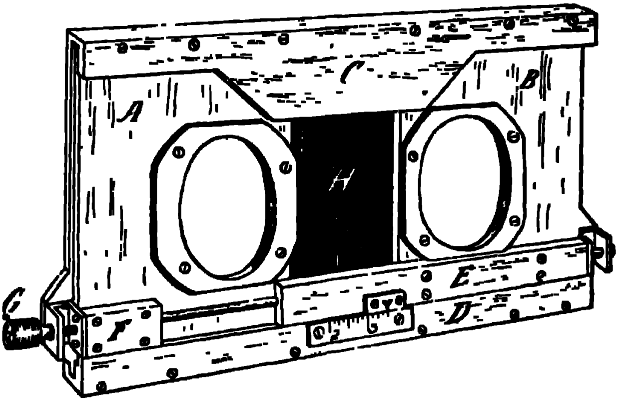


Perspective view of the front, showing the lenses at the minimum separation

A, and E to panel B, they therefore travel with the panels while E always overlaps panel A sufficiently to protect the lower edge of the bellows in the gap between the two panels C is widened out in the centre for the same purpose E and D are rebated, so that no light can pass between them The upper and lower edges of the bellows, H, are perfectly protected from direct light, but not from oblique light passing behind C and E in the space left in front of the bellows when the panels are separated Any possible leakage from this indirect light is, however, perfectly guarded against by two thin metal strips, fixed at the back of the panel These strips also prevent any buckling of the bellows at the back, and the absence of similar guards in front necessitates the use of rods which pass through perforations in the folds of the bellows, and serve as guides to keep them in place

The adjusting screw, G, is a ¼ Whitworth thread One complete turn of this screw alters the separation by 1-20th inch The scale attached shows ⅛th of an inch, the index moving with E and panel B while the scale is fixed The screw fits tightly in a square slot cut half in the panels and half in F and E and this fact, coupled with the small pitch selected, renders an accidental movement almost impossible The screw plates are fixed at the ends of F and E where shown, the end plates being bearings only The head of the screw is within easy reach while focussing, and the separation can be adjusted to a nicety while watching the images on the ground glass

The front illustrated is 3¾ ins wide, 7½ ins long and ½ in thick It was made to fit the front of a blind shutter and to give a maximum separation of 3¼ ins By allowing for only 3 ins separation, and substituting metal for wood, it could be diminished in both



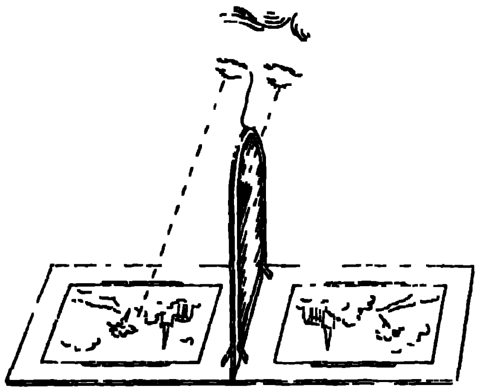
View of the front, showing the lenses at the maximum separation

length and thickness, but it is by no means bulky as it stands —"B J," Apr 23, 1909, p 319

The above adjustable panel may also be used so as to dispense entirely with trimming down of the prints obtained from the stereoscopic negative To effect the adjustment in the camera, first of all make a negative, and then measure the separation between the corresponding margins of the two pictures Note the distance, and afterwards, when making other negatives, simply adjust the front so that the corresponding images of the nearest details in the subject are separated by a slightly less distance If the print trimming is then confined to the removal of the margins, it will be found that in the mounted print these nearest details are separated by a slightly greater distance than the print margins, which is the result that is most usually desirable If it is desired to make any part of the subject appear to stand out in

front of the mount, then the adjustment in the camera must be of just the opposite nature That is to say, we must adjust the front so that the images of the near object are rather more widely separated than the margins of the negatives, but this is only desirable in very exceptional cases —"B J ," May 7, 1909, p 358

Modified Dixio Stereoscope —A Lockett points out that a more useful form of the Dixio stereoscope for commercial purposes, although less efficient than the normal pattern, is one in which the two prints on either side of the division form a flat surface It is necessary to have the pictures rather more widely separated and to use a larger mirror—that is, one extending down to the bottom of the panel in the case of a large picture —"B J ," Sept 10, 1909, p 701



Stereoscopic Vision in the Stereoscope —C Welborne Piper, by means of a "vision box," described in a paper before the Photographic Convention, concludes that the appreciation of relief in the stereoscope depends on perspective and on the sensations aroused by the unusual manner in which the acts of convergence and of accommodation are accomplished These unusual sensations would not exist at all but for the fact that the two pictures which make up the slide are in one plane, so that the accommodation does not vary with the convergence as it does in ordinary vision Experiments with the vision box show that if perspective effects are excluded no appreciation of relief exists in the case of a real object, though in the case of a stereoscopic representation of it the relief is obvious at a glance The vision box was designed to permit the observation of two simple points in space at differing distances, no perspective effects being visible The general conclusion was that we rely entirely on perspective when observing the natural object, while in the

stereoscope our appreciation of relief is further aided by parallax Appreciation of distance in all cases depends on perspective alone.—"B J." July 16 1909, p 549

STEREOSCOPIC PROJECTION

Stereo Projection by the Pinatype Process.—Dr E Konig has worked out suitable dyes for staining transparencies and for the making of viewing-filters to be used in the so called "Anaglyph" method of obtaining stereoscopic effects A pair of pinatype transparencies are projected on the screen in approximate superimposition, one stained with red and the other with green dye The observer is provided with a pair of spectacles fitted with red and green glasses, the red image on the screen being observed through the green glass, and *vice versa* In working the process the special dyes known as "complementary red" and "complementary green" are employed in making pinatype transparencies from the pair of stereoscopic pictures For the observation filters the following formulæ are used —

Gelatine	6 gms
Distilled water	100 c c s
Solution of Rapid Filter Red 1 1 40 in water)	200 c c s

The mixture for the green filter . as follows

Gelatine	6 gms
Distilled water	100 c c
Naphthalin green solution chem pur (1 100 in water)	5 10 c c s

The spectacles for use by daylight should 1 10 for projection purpos

In regard to the projection of the transparencies, it should be noted that the latter should be placed in the carrier so that the green picture faces the light source, and the spectacles so used by the observer that the right eye looks through the green filter the left eye through the red —"B J," Nov 6 1908, p 848

Arising out of a demonstration of this method at the Royal Photographic Society the following notes deal with the conditions which would appear to militate against the successful use of this method Assuming that the right-hand stereo picture was printed in green and viewed through a red screen placed in front of the right eye, while the left-hand red picture is seen by the left eye through a green screen, it is evident that the pictures cannot coincide in all parts If the overlap of the green picture towards the right is too great, say, over 2½ inches, it will be impossible to combine the pictures in the eye—that is, the overlap in the actual slide must be such that it should be magnified on the screen to a greater amount than 2½ inches If, however, the green image overlaps the red on the left, the amount of overlap on the screen will not affect the power of combining the images, since any degree of convergency can be given to the visual axes, but the combined image will then appear to be in front of the screen In short the control is the same as that

exercised in trimming an ordinary stereoscopic print, but it is evident that the distance of the lantern from the screen must be taken into consideration.

It may often be difficult to avoid exaggerated relief in the case of near objects, since these latter must be observed under a very small angle of convergence. It therefore seems that to avoid such distortion in the projection method objects near to the camera must be avoided; that is, long-focus lenses employed when making the negative.—"B. J.," Feb. 26, 1909, p. 154.

Dixio Stereoscopic Lantern Slides.—A. Lockett suggests the application of the Pigeon, or "Dixio," method of stereoscopic observation ("B. J. A.," 1909, p. 563) to projection. The two stereoscopic negatives are reduced in the camera on to a single lantern plate, the pair being obtained side by side. As in the case of prints for the Dixio stereoscope, one transparency must be the reverse of the other. The slide being projected in the ordinary way, the spectator is provided with a small piece of mirror, which he holds in an upright position against the nose, pointing the plane of the mirror towards the central division between the two pictures on the screen. Then, looking at the right-hand picture with the right eye, the mirror is slightly turned until the reflection of the left-hand picture falls over the first, thus giving the stereoscopic effect.—"A. P.," Nov. 17, 1908, p. 468.

Photo-Micrography.

Photo-Micrography with a Reflex Camera.—Dr. W. Scheffer describes a camera of the reflex type especially constructed by the firm of Carl Zeiss for photo-micrographic work. The arrangement allows the operator to adjust both the coarse and fine focussing, the stage movements, the Abbé illuminating apparatus, and other lighting accessories on the optical bench—all with one hand, whilst watching the effect of this adjustment on the ground glass.—"B. J.," Mar. 12, 1909, p. 194, and Apr. 16, p. 307.

IV.—NEGATIVE PROCESSES.

THE WET COLLODION PROCESS

Brown Stains on Wet-Plate Negatives—A wet collodion negative, which is finished by blackening with sulphide of ammonium or sodium, sometimes shows bad brown staining This is generally due to insufficient washing between development and fixing But it may be due to insufficient fixing, and where the fixing is done by placing the plate in a bath of cyanide solution, this ultimately becomes so saturated as to fail to dissolve out the double cyanide and silver salt first formed on placing the negative in it Thus, although the negative appears fixed, it is not so really, and a brown stain results When the fixing bath is renewed it will be found this trouble disappears—"B J," Feb 12, 1909, p 125

PLATE BACKINGS

Anti-Halation Plate—J Hauff and Company, of Feuerbach, have patented the use of ferrocyanide of molybdenum as an anti-halation substratum for gelatine plates It is formed by coating the glass plates with a solution containing in 100 ccs of water 3 gms of gelatine, 1 5 gms of potass ferrocyanide, and 1 gm of ammonium molybdate When this coating has set, it is treated for five minutes in two per cent hydrochloric acid, and placed to dry It is evidently intended that the backing should be removed by the alkali of the developer, so that if it is found that the process can be carried out satisfactorily in the factory, the user of these anti-halation plates will not be called upon to perform an additional operation—Ger Pat No 210,057 of Dec 14, 1907

EMULSIONS

Silver Acetylide Emulsions—Dr C F K Mees and S H Wratten have prepared silver acetylide emulsion with the object of discovering if a latent image is formed on exposure to light Silver nitrate solution was precipitated with ammonia and further ammonia added until the precipitate just redissolved Five per cent of soft gelatine was then added to the solution and acetylene gas led through the latter in the dark A heavy crust of the salt was formed on the surface and a fine-grained emulsion was also formed On removing the crust and coating plates with the emulsion, it was found that the plates were very sensitive to light (they showed a change in about 1-10th the time of printing-out

paper), but gave no sign of the formation of a latent image Alkaline developers blackened both exposed and unexposed plates equally, while neutral or acid developers either blackened them uniformly or produced no change Since silver acetylide is a compound, a sub salt of which is extremely unlikely, the authors regard the experiment as support (although of a negative nature) of the sub-salt theory of the latent image—"Phot Journ," Oct, 1908. "B.J.," Oct 30, 1908, p 831.

Orthochromatic Processes.

Properties of Dyes—Dr C E K Mees and S H Wratten described the methods and apparatus used in measuring absorption spectra of dyes used for sensitising plates and for making light-filters and safe-lights In the case of dyes for light-filters it is usually required that a filter should absorb as completely as possible the region which it is required to absorb, and transmit as completely as possible the region which it is required to transmit The degree to which a dye will do this depends mainly on the sharpness of its absorption band The edge of an absorption band which is towards the red end of the spectrum is nearly always sharp, and such dyes do not absorb light other than that in their absorption band proper A red dye having an absorption band in the yellow-green, or a yellow dye having an absorption band in the blue, are bright dyes transmitting the red or green and red portions of the spectrum completely, but if the absorption band faces the other way, as in the blue and blue-green dyes, it will generally be more gradual, and there will be a great absorption of the portion of the spectrum which should be transmitted This is well shown in the case of the tri colour filters The red tricolour filter will transmit about 75 per cent. of the incident red light, but the best green filter only about 35 per cent. of the incident green light, and a blue filter only about 16 per cent of the blue light When examining dyes for use with filters, the great object is to choose those which have the sharpest possible absorption and the least residual absorption in other portions of the spectrum

In making blue filters, toluidine blue is of great use, although, like toluidine-green, it has a shallow absorption The new filter, blue-green, has a sharper absorption, and is most useful for green and blue-green filters For absorbing the extreme red, methylene-blue has a unique absorption, showing a double band, with maxima at 6,800 and 6,100, but unfortunately, like auramine, it is sensitive to heat, though permanent towards light; if possible it is well to avoid using it Erio-glaucine, one of the Patent-blue series, is made by Geigy, of Basle, and has a sharp absorption in the red, with maximum at 6,250

Dyes absorbing the yellow and orange part of the spectrum are nearly all basic, and thus are not suited for use with gelatine nor for mixtures with acid dyes. The methyl-violets (basic) can be well replaced by the acid violets, which are of even sharper cut in the

deep red The rapid filter blue of Hoechst has also the advantage of being an acid dye, but is of very shallow cut

For the absorption of the green two groups of dyes are used, the fluoresceines (acid) and the rhodamines (basic) Fluoresceine itself or uranine absorbs only the blue green Rose-Bengal has a sharp band, with a maximum at 5,600, and is probably the best dye for the red filter in three-colour work It is not quite permanent, any more than most of the dyes mentioned, but will stand full daylight and sunlight for three months Rhodamine B is the only dye of this class of general use, but there is another dye—Xylen-red (Hoechst) --which can be taken as belonging to both groups It is both an acid and a basic dye, works perfectly with gelatine, and will mix with the acid dyes It has the sharpest absorption band towards the blue, and makes a nearly perfect *minus* green dye

The only yellow dye which absorbs the violet satisfactorily and yet transmits the ultra-violet is para nitroso-di-methyl-aniline Tartrazine absorbs a good deal of ultra-violet, but not all. Filter Yellow K absorbs all the ultra-violet except in dilute solution, in which case (for pale filters) picric acid is better, though this cannot be used if the filter is much exposed to light as the dye goes brown For the absorption of the ultra-violet from 3,900, aesculine is the only known substance, but if the extreme ultra-violet from 3,600 to 3 000 only need be absorbed beta naphthol di-sulphonic acid is a more satisfactory substance, and does not darken in light nearly so quickly

In order to make a filter which transmits the ultra-violet but does not transmit the visible spectrum, it is necessary to use para-nitroso-di methyl-aniline with blue-violet dyes, and unfortunately these blue-violet dyes always strongly absorb the ultra-violet, the rhodamines and xylen red having an absorption band there In order to avoid this difficulty there may be obtained from Schott and Genossen, of Jena, some of their blue uviol glass, which is extremely transparent to the ultra-violet, by cementing the film between two pieces of this glass a satisfactory ultra-violet filter can be prepared

The paper gives photographs of the absorption spectra of some twenty-five dyes—viz, those of most service for the making of filters --"Phot Journ," May, 1909, p 235; "B J," May 21, p. 399, and May 28 p 422, 1909

The authors have since published an atlas recording the absorption spectra of dyes of service in orthochromatic photography

Cyanine and Other Dyes as Mixed Colour Sensitisers of Gelatine Plates —A thesis by Guido Daur gives the results obtained by using the chief sensitisers in various mixtures both as bath-sensitisers and as additions to the emulsion —A translation of the paper appears in "B J," July 23, p 572, July 30, p 592, Aug 6, p 610, Aug 13, p 630, and Aug 20, p 649, 1909

Developing Panchromatic Plates —R Krayn has patented the use of an acid bath or acid developer for the treatment of red-sensitive plates prepared with dyes, such as pinachromes, which are decolourised by acids This has for its purpose the destruction of the

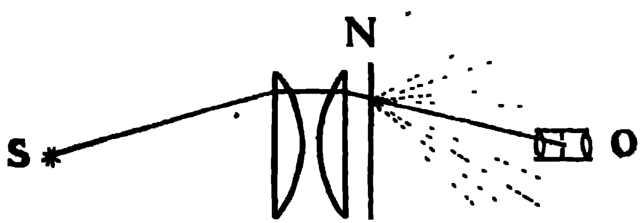
red-sensitiveness of the plate after exposure, and is on the lines of the acid diamidophenol developer which has been stated to be effective for the same result, although some experimenters have failed to find that it does behave in this way If the process recommended by Krayn be that mentioned in the patent specification—namely, the use of a ½ per cent bath of sulphuric acid before development with ferrous oxalate or the addition of acid to the developer itself—it is possible that the stronger sulphuric acid may be able to effect a more complete action than that of sulphurous acid —Ger Pat, No 209,937, Oct 4, 1907, "B J," July 16, 1909, p 546

Aberrations Caused by Colour-Screens.—G Sacco has published a mathematical paper describing the permissible departure from flatness in the case of light-filters placed behind a lens His results show that a filter should be rejected if the angle between its two surfaces is greater than one minute —"B J" (Colour Supplement) (from abstract by L P Clerc in "Procede," Jan p 7, and Feb, p 21, 1909) July 2, 1909, p 53

Sensitometry, etc.

H and D Photometer.—Douglas Carnegie recommends, in place of the ordinary grease spot indicator, a paraffin block indicator first used by Joly It allows of readings being made with much less fatigue The drawing of the block and directions for making it are given in "B J," Mar 12, 1909, p 197

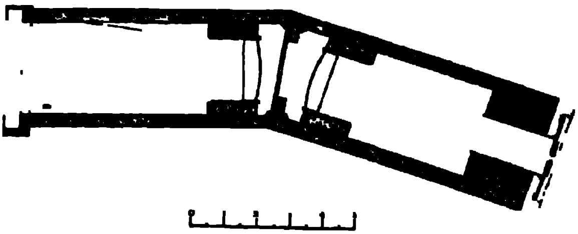
Scattering of Light from the Films of Negatives.— André Callier has made elaborate measurements of the extent to which the light passing through a photographic negative is scattered instead of continuing in the directions in which it approached the negative — "Phot Journ," Apr, 1909, p 200



Dr C E. K Mees, in an abstract of Callier's paper, points out that this scattering of the light accounts for the greater contrast obtained when making an enlargement by artificial light (arc or limelight) as compared with daylight The difference is due to the fact that the light scattered from any point of the negative does not enter the objective (See Fig) Its effect is thus lost, whereas in contact printing this is not the case If the light

reaching the negative in the enlarging lantern is itself perfectly diffused or scattered beforehand the effect is no longer seen, results obtained by enlargement having the same gradation as those by contact In order to secure this scattering of the light it is necessary to use opal glass *in contact with the film* of the negative. The difference between enlarged and contact prints is, of course, less marked when daylight is used as the illuminant than when a light of small area, such as arc or limelight, is employed —"B J," Apr 30, 1909, p 343

A Simple Spectrograph --Chapman Jones, in designing a spectrograph most suitable for the general use of those making tests of plates, etc , prefers the construction shown in the drawing The instrument consists of a tube, or gutter with a lid, of square, cross-section 3 ins , the two parts being inclined at an angle of 18 deg The changing back is at one end and the slit, or series of slits, at the other, being carried in a brass tube sliding in a thick cloth lined tube The grating of 15 150 l nes to the inch is mounted in the centre, a lens on either side of it each mounted in a square fitting to slide easily into place and to remain in alignment whatever the position of the apparatus The lenses are the ordinary achromatic combinations as made for field glasses, 2 ins in diameter and about 8 ins focal length The slits used are 026 mm



INCHES

FIG

(1-1,000th of an inch), 1 mm (1 250th of an inch), and 2 mm (1-125th of an inch), in addition to the aperture in the slit-plate carrier, which is 2 mm (1-12th of an inch), and is useful when material of very low sensitiveness is being examined A diffusing screen placed thus in front of the slit is made with two pieces of finely ground glass separated by a small mask and bound together with the ground surfaces outwards This tends to uniform results and renders the adjustment of the direction of the light of much less importance Exposures, with rapid plates and 1 mm. slit, are about as follows —The crater of a small (4 or 5 ampères) arc 12 ins distant from the ground glass in front of the slit, from ten to twenty seconds, a Nernst lamp with two filaments 4 ins away, three to six seconds, a candle 2 ins away, one and a-half to three minutes, and very poor daylight, when an exposure meter exposed

out of doors needed two minutes to reach the standard tint (about four seconds would suffice on a bright day), from thirty to sixty seconds The control given by altering the slit width would in all cases bring the necessary exposures within convenient limits The instrument is made for ¼ plates, but for longer spectra the lens between the grating and the plate is replaced by one of greater focal length and the photograph taken by aid of a larger camera — "Phot Journ," Feb, 1909, p 110

Developers and Development

DEVELOPERS

Properties of Developers—A and L Lumière and A Seyewetz have published the result of examining a number of developers as to the effect of temperature, etc, upon contrast, etc They find that in the case of developers working without alkali (metoquinone and diamidophenol) there is no appreciable loss in the contrast produced on rise of temperature of the developer, but fog increases to a considerable extent In the case of developers working with alkali their results are as follows —

Developer	Reduction of Contrast with Rise of Temperature	Increase of Fog with Rise of Temperature
Pyro	Slight	Very considerable
Paramidophenol	Slight	Very slight
Metol	Slight	Slight
Hydroquinone	Very great	Very great
Metol-hydroquinone	Slight	Slight
Hydramine	Slight	Very slight
Adurol	Very great	Great
Edinol	Slight	Very slight
Glycin	Slight	Considerable
Eikonogen	Slight	Slight
Pyrocatechin	Slight	Very slight

Among the developers amenable to reduction of contrast by dilution they place first diamidophenol, pyro, paramidophenol, metol, glycin, and eikonogen Those less marked in this respect are hydroquinone, metol hydroquinone, adurol, edinol and pyrocatechin The effect is less still with metoquinone, and not noticeable at all with hydramine In the case of developers which work without alkali—that is, with sulphite—reduction of the sulphite tends to increase the contrast—more markedly in the case of diamidophenol than in that of metoquinone On the other hand, more sulphite or dilution of the developer reduces contrast, the practical method being to weaken the developer (diamidophenol) with about three times its bulk of a 5 per cent solution of anhydrous sulphite of soda

For increase of contrast the most practical means with all developers is addition of potass bromide in moderate proportion only Those giving the maximum increase are pyro, hydroquinone, adurol, glycin, and eikonogen —"B J," Aug 13, 1909, p 627.

Acid Diamidophenol Developers.—M. G. Underberg gives the following stock solutions and developing formulæ for use with diamidophenol developer (compare those by G. Balagny, "B. J. A.," 1909, p. 573).

BB.—Potass bromide 10 per cent. solution	50 ccs.	2 ozs.
Bisulphite liquor	100 ccs.	4 ozs.

This keeps well for several months in closed bottles, but there is no object in preparing more than 150 ccs. (5 ozs.) at a time.

S.—Soda sulphite, pure, anhydrous	20 gms.	¾ oz.
Hydroquinone	1 gm.	15 grs.
Water, boiled, hot	100 ccs.	3½ ozs.

Add the sulphite to the freshly boiled water, stirring well, then add the hydroquinone, filter, and keep in stoppered bottles of 100 c.c.s. (3½ ozs.) capacity. It is convenient to make up 300 c.c.s. altogether (three bottles), which quantity will keep for, at any rate, three months in regular use without appreciable alteration.

Diamidophenol made up with acid sulphite is a perfect developer of all brands of plates, both extra rapid and orthochromatic. It is a developer which never gives fog nor stain, and possesses great latitude in use as regards the degree of contrast or softness which may be obtained with it, always assuming that development is thorough. This latter is an absolute essential in the use of the developer, and those who have not obtained satisfaction in the use of diamidophenol may be certain that their failure has arisen from negligence in this matter. With almost all the brands of plates the image should appear quite distinctly on the back of the plate. Developing in this thorough way, up to the point when the image commences to veil over, there are obtained excellent negatives, the slight veil which appears towards the latter part of development completely disappearing in the fixing bath. The tendency when commencing the use of the developer is to stop development too soon. In the case of those who employ the two solution method given below, over-development will not do any harm, whilst curtailed development leaves the negative without its full detail and brilliancy. The following is the method of working the two-bath system. Two developing baths are prepared as follows:—

A.—For over-exposure: gives hardness		
Solution S	8 ccs.	¼ oz.
Diamidophenol	.5 gm.	8 grs.
Solution BB	15 ccs.	½ oz.
Water	100 ccs.	3½ ozs.
B.—For under-exposure: gives softness		
Solution S	30 ccs.	1 oz.
Diamidophenol	.5 gm.	8 grs.
Solution BB	24 drops	24 drops
Water	250 ccs.	8¾ ccs.

The negative is first placed in A. If at the end of three to five minutes no image has appeared, it is placed in bath B, and carefully watched. If the image on its first appearance shows a tendency

to flatness and insufficient contrast, it is at once placed in bath A. If, on the other hand, it appears vigorous without detail, it should be left in B until it has acquired the necessary softness The plate is thus transferred from A to B, and inversely, according to the result desired, in either case being developed through to the back Care is necessary to work in a perfectly safe light, and to avoid removing the plate too frequently from the developer With some practice it is quite easy to judge of the thoroughness of development by reflected light whilst the plate is lying in the dish After development the plate is given a good rinse and fixed in a bath of acid hypo

The following procedure may be of advantage when a large number of plates are to be developed The bath A given above is made up, and water added to make a 1,000 c c s (35 ozs) altogether The negatives are placed in this weak bath, and at the end of five minutes one or two plates taken out and developed by the two-bath method already given By the time these two plates are developed others will commence to appear in the stand solution A second two, those which have come up the most, are then taken and developed in the two solutions, this method being followed until the whole batch has been got through —"Photo Revue," July 4, p 1 July 11, p 10, July 18, p 18, July 25, p 25, 1909, "B J," July 23, 1909 p 570

For the formula for development of bromide and gaslight papers, see under "Bromide and Gaslight Papers"

A formula for making a powder diamidophenol developer ready for solution in water is given as follows by M Underberg —

Soda sulphite anhydrous	30 gms	1 oz
Diamidophenol	5 gms	80 grs
Soda metabisulphite cryst	50 gms	1¾ ozs
Potass bromide	3 gms	45 grs

These substances are pounded together with mortar and pestle until a fine powder is produced, and the mixture is stored in well-closed tubes The above mixture is dissolved in water, 1,000 c c s or 35 ozs —"Photo-Revue," Aug 22, 1909, p 960; "B J," Aug 27, 1909, p 673

Correction of Exposure with Diamidophenol —A and L Lumière, as the result of testing the diamidophenol developer against pyro, have found that the former does not admit of the control recommended in the revised instructions for the development of Autochrome plates ("B J A," 1909, p 649) They find the best treatment for under-exposed negatives is to mix the normal diamidophenol developer with three times its volume of 5 per cent sodium sulphite solution In the cases of over-exposure the use of bromide is preferable to that of bisulphite An average dose of bromide is 5 gm per 100 ccs of developer=2¼ grs per oz —"B J," Apr 16, 1909, p 306

Metol Poisoning.—Dr N T Beers, as the result of treating a number of cases of metol skin poisoning, states that there is no evidence that metol is absorbed into the general circulation It is limited to parts of the body coming in contact with the solution Cases of sores arising in other parts of the body proved to be caused by other disease mistaken for the metol poisoning Dr Beers advises those affected by metol to give it up. Of preventives, the best for the skin is a saturated solution of paraffin in benzine (petrol), in which the fingers are dipped before handling the metol in any form The less severe form of metol skin disease is best treated with a soothing lotion or ointment such as --

Lotion

Acid carbolic	40 grs
Powdered calamin	60 grs
Zinc oxide	2 drs
Glycerine	2 drs.
Lime water	1 oz
Rose water to make	4 ozs

The lotion may be applied during the day and a salve by night, covering the parts with a little absorbent cotton and a light bandage or glove-finger When the disease arrives at the chronic form, where the skin peels off and a denuded area exists, the use of a soothing ointment is recommended

Salve

Acid salicylic	15 grs
Acid boric	1 dr
Powdered starch	2 drs
Zinc oxide	1 dr
Petrolatum	1 oz

If cracks form on the finger ends or the skin remains rough and scaly, use one of the above salves at night, wash off in the morning, and after careful drying apply flexible collodion with a small camel's hair brush The collodion serves as a thorough protective during the day and allows one to dispense with bandages, glove-fingers, etc At night a little ether will remove the collodion preparatory to applying the salve Many chronic cases heal nicely under flexible collodion alone Do not apply the collodion too thickly, lest it cracks and the cracks extend into the skin Always wash off one layer with ether before applying in order to prevent cracking later —"Phot Times," Apr, 1909, p 127.

A Test for Metol.—M A Nicolle states that commercial metol may contain paramidophenol sulphate, which interferes with the keeping qualities of the developer The following test is described for detecting the presence of this substance —About 1 gm of the sample is shaken with 3 c c s of concentrated hydrochloric acid If after a few minutes the solution is not perfectly clear, paramidophenol sulphate is present Mineral adulterants, such as sulphides, etc, may be detected by incinerating a portion of the sample, in no case should the ash exceed 0.5 per cent —"B J" (from "Moniteur Scientifique"), May 14, 1909, p 374.

Pyramidol.—L. P. Clerc states that this developer, prepared by the Brugg Chemical Co., Brugg, Switzerland, dissolves to the extent of 1½ parts in 100 parts of water. A plain 1 per cent. solution *will* give a usable negative, but requires eighteen hours for its action. With twice its weight of anhydrous sulphite of soda added the image appears in three minutes, but full vigour is not attained under one hour. The developer thus requires an alkali in practice, and as the developer dissolves freely in alkaline solutions, it can be put up in concentrated single solution. Suitable two-solution formulæ are:—

A.	Soda sulphite, cryst.	70 gms.	1½ ozs.
	Pyramidol ..	10 gms.	90 grs.
	Water	1000 c.c.s.	20 ozs.
B.	Potass carbonate, dry	50 gms.	1 oz.
	Water	1000 c.c.s.	20 ozs.
	or		
C.	Caustic potash	10 gms.	90 grs.
	Water	1000 c.c.s.	20 ozs.

According to the choice of the alkali, the developer is compounded as follows:—

A, 3 parts; B, 3 parts;
or A, 3 parts; C, 2 parts.

Water may be further added to slow down development.—"Bull. Soc. Fr. Phot.," January 15, 1909, p. 43.

FACTORIAL DEVELOPMENT.

Modified Factorial Development.—MM. Lumière and Seyewetz have advised a modified method of factorial development. They commence development with a solution containing little alkali, and, therefore, giving a longer period before the first appearance. According to the time of this first appearance they modify the developer and use it for a greater or less total time. The following formula answers admirably for the process:—

A.	Pyro	30 gms.	260 grs.
	Soda bisulphite (commercial solution)	10 c.c.s.	1½ drs.
	Water	1000 c.c.s.	20 ozs.
B.	Soda carbonate (anhydrous)	35 gms.	310 grs.
	Soda sulphite (anhydrous)	75 gms.	660 grs.
	Potass bromide	5 gms.	44 grs.
	Water	1000 c.c.s.	20 ozs.

A, 10 c.c.s.; B, 20 c.c.s.; water, 90 c.c.s.

This is the normal developer, and is the formula which can be used straight away for correctly exposed negatives. In order to accentuate the differences between the times of exposure of plates which have received varying exposures, only half of the normal quantity of the alkali B solution is first employed; that is to say, the developer is made as follows:

A, 1 part; B, 1 part; water, 9 parts.

The authors determined, by experiment, the relative proportions

of the two solutions, A and B, which should be used in order that the time of development of plates which have received a certain multiple of the correct time of exposure may be dealt with

The following table, compiled as the result of these experiments, applies to the developing solutions of temperatures between 60° and 65° F :—

Time of Appearance of First Outlines of Image, not Counting the Sky: "Sigma" and Blue Label Plates	Time of Appearance of First Outlines of Image, not Counting the Sky: Violet Label Plates	Degree of Exposure, i.e., Ratio of Exposure Given to the Correct Exposure	Solution Added Immediately After the Appearance of the First Outlines	Total time of Development Including Time of Appearance.
Minutes	Minutes			Minutes
2 25 to 2 40	1 55 to 2 5	8 times	20 c.c.s A	18
2 41 to 3 15	2 6 to 2 20	4 ,,	10 ,, A	18
3 16 to 3 30	2 21 to 2 45	2 ,,	nil	15
3 31 to 3 50	2 45 to 3 10	normal	10 ,, B	12
3 51 to 4 15	3 10 to 3 40	½ ,,	15 ,, B	13
more than	4 15 to 3 40	¼ ,,	20 ,, B	13

For a temperature above 17° or below 15° the rule of Houdaille is used [1]

[1] "Bulletin de la Société Française de Photographie, 1904, page 97 For each degree below or above 15 deg add to or subtract from the total time of development to the extent of 5 per cent

With this new method of development it is possible to determine, in a very approximate way, the degree of over- and under-exposure of a plate In the case of over-exposure the correction which can be made by means of a modified developer is such that one can obtain from plates, which have received eight to ten times the correct exposure, negatives which have their contrasts almost as good as those of plates correctly exposed —"B J," Jan 1, 1909, p 3

TIME DEVELOPMENT

Time Development —Dr E Stenger gives a review of time development methods, including the Watkins system of correcting for variations of temperature —"Atelier," Mar, p 31, and Apr, p. 45, 1909

Thermo Development—The growth of time development with the aid of a thermometer started from Hurter and Driffield's dictum that with a stated developer used at a stated temperature a fixed contrast is attained in the negative even with varying exposures. Houdaille in France, Sheppard, Mees, and Ferguson in England worked out the law which states the varying times required for varying temperatures to attain the same result. They found that

the same formula does not apply to all developers This difference is indicated by the temperature coefficient, which is the time-ratio for a difference of temperature of 10° C with a stated developer

With the formula a table of times for different temperatures can be compiled for a stated plate and a stated developer. But as plates vary greatly in their development speed, another table must be compiled for another class of plate

Watkins discovered that this formula can be graphically rendered by an even division scale for temperatures in contact with a logarithmic scale for times, and if the one scale is moveable relative to the other, they can be adjusted for different classes of plates

There are two commercial applications of these scales In the one (Watkins' Time Developer) a rotatable temperature scale encircles the bottle of concentrated developer, and the temperatures are read against the time on the log scale The varying times (at 60° F) are indicated by code letters for different plates on a speed card issued with the developer and when the scale is set to this time for 60°, the time for any other temperature can be read off In a more recent application of the same principle (Watkins' Time Thermometer) the stem of a thermometer itself takes the place of the temperature scale, and the log scale of time (minutes development) is placed against this It is not convenient in a dipping thermometer to have a scale adjustable for different plates, and the scale is therefore fixed (at 6½ minutes at 60°) and necessary adjustment for different classes of plates is made not by altering time, but by altering the dilution of the developer in accordance with a table used in connection with code letters on the speed card With such a thermometer (which has a second scale of longer times for tank development) the time is read against the top of the mercury, and it is available for several (but not all) types of developers

For those who wish to ascertain the temperature coefficient of their own developer and to draw up a table of times and temperatures for their own use, a simple method is detailed, and diagrams provided for carrying it out, in the fourth edition of the Watkins' Manual

STAND DEVELOPMENT

Stand Development with Acid Diamidophenol—G T Harris, as the result of practical trials made to decide between pyro and diamidophenol for tank development on a commercial scale, recommends the latter, the formula adopted was as follows —

Sodium sulphite	500 grs	28 5 gms
Potassium metabisulphite	100 grs	5 7 gms.
Potassium bromide	10 grs	0 6 gm
Diamidophenol	50 grs	2 8 gms
Water	40 ozs	1000 c c s

Three dipping-baths were used, each containing 40 ozs One of these dipping baths had 400 grs of sodium sulphite and 200 grs of potassium metabisulphite in place of the quantities given above,

and any plates suspected of over-exposure were first placed in the more restrained bath The time of development in the normal solution necessary to give good printing density averaged about 10 mins

There were no markings of somewhat less density than the rest of the plate, which sometimes appear on parts of the plate near the top and bottom of the tank when using pyro —"B J," Mar 26, 1909, p 235

DAYLIGHT DEVELOPMENT

F Jeannot and M R Bremner have described a solution to be used for the simultaneous development and fixation of plates and papers in daylight It contains picrate of magnesia, or of soda, as the colouring agent A suitable mixture is said to be as follows.—

Magnesium picrate	81 parts
Sodium sulphite (anhydrous)	544 parts.
Sodium hyposulphite (hypo)	250 parts
Diamidophenol	125 parts.

This powdered mixture is dissolved in water to the extent of about 4 gms per 100 c c s (about 20 grs per ounce), and the exposed plate or print having been placed in it in the dark, the further operation may be continued in daylight or other actinic light —Eng. Pat No 15,657, 1908, "B J," Jan 29 1909, p 88

Potass Iodide in Daylight Development —A 4 per cent solution of potass iodide is said to be marketed in Germany under the name of "Aktinal" as a de-sensitiser of exposed plates, which latter may then be brought into daylight and development done in a metol-hydroquinone developer made up with caustic potash and fully restrained with bromide —"Chem Zeit," Aug 19, 1909, p. 878, "B J," Aug 27, 1909 p 661

DEVELOPMENT MISCELLANEA

One Minute Development —Harold Baker recommends for portraiture negatives the application of a No 1 solution for 30 seconds, followed by treatment with the alkali or accelerator for a further 30 seconds without washing between The solutions are —

No 1	Metol	4 drs
	Hydroquinone	8 drs
	Potassium metabisulphite	2 ozs
	Potassium bromide	4 drs
	Water to	100 ozs
No 2	Sodium carbonate	12 ozs
	Water	100 ozs

If exposure has been on the under side the plate may remain for a shorter time in the No 1 bath and for longer in No 2 in order to secure full density This is useful also in the case of strong contrasts, for a greater density with normal exposure give a long time—say one minute—in each bath

For over-exposure give a longer time—two minutes—in No 1 and shorter immersion in No 2

As the No 2 solution is used it gives greater density owing to the transfer of a certain amount of developer into it, but after a few plates have been put through this gain in density drops off Any No 1 bath left over may be put away for re-use, but No 2 must be used fresh for each batch of plates

The method effects a saving of time and of developer, gives results with more detail, especially in the shadows, and obviates a certain amount of retouching Although not suited for every plate, it works admirably with the "Zenith," which plate is very highly commended by Mr. Baker for portrait work —"Phot Scraps," Aug, 1909, p 57, "B J," Aug 6, 1909, p 609

Brush Development—R W Phillips recommends the following procedure for portrait negatives, using the three-solution (A, B, C) Seed developer Two solutions are made up, one the regular 1 oz of each to 8 or 10 ozs of water, as you would in developing straight, the other with the carbonate separate from the pyro and sulphite by making up a solution in regular quantities of pyro and sulphite with the regular amount of water Then use a solution of one-half carbonate and half water, or two-thirds carbonate and one-third water, whichever is found to suit the strength of negative desired In the case of a negative exposed with a subject in white drapery, develop the plate until the general composition is apparent on the surface of the plate, then pour off this regular developer and wash the plate Now pour on the pyro and sulphite solution, previously made up, and hold the negative up to the light in the hand, flat, then use a brush, or soft cotton, saturated with the carbonate solution, and rub over that portion of the negative which you wish to bring out the most prominently This must be done the first time very quickly, placing the negative immediately back in the solution, and then repeat the operation, blending the carbonate well over the plate so as not to get streaks

The principle involved is this The negative is developed only to a slight extent in the first immersion, and as soon as the pyro and sulphite solution is poured on, development practically ceases Then you control the accent of high lights absolutely with your carbonate solution Considerable practice will have to be had in most cases before you become master of this form of local work Under expose rather than over-time negatives for brush development, as the full-timed negative is much harder to control In developing a 10 x 8 plate use a 1-in camel's hair brush for the first brushing, going all over the plate with this, twice over the parts to be accented to once over the other part of plate Then a brush less than half the size also of camel's hair can be used for pointing up —"Bull Phot," Oct. 28, 1908, p 278, "B J," Nov 13, 1908, p 865

Pure Soda Sulphite—H Hartley and W H Barrett have described a method of preparing anhydrous soda sulphite in a state of complete purity —Into a solution of pure sodium carbonate of

suitable and known strength a current of sulphur dioxide was passed until the increase in weight showed that the conversion into sodium-hydrogen sulphite was complete; whereupon a quantity of sodium carbonate solution equal to that originally used was added. On heating to a temperature a little over 212° F the anhydrous salt was deposited, and a further yield was obtained by evaporating the solution in a stream of hydrogen It appears probable that by slightly modifying the method a commercial product might be obtained of high purity and nearly free from sulphate The authors confirm MM Lumière's conclusions that pure anhydrous soda sulphite does not deteriorate by oxidation in the air

The solubility of the anhydrous or true salt varies very little with the temperature, but the solubility of the crystallised (heptahydrate) increases rapidly as the temperature is higher Thus a saturated solution prepared at 99° F contains 44 parts by weight of anhydrous sulphite in association with 100 parts by weight of water If instead of this we take a solution saturated at 65° F. the composition will be 25 of the true sulphite and 100 of water.

As 65° F may be looked upon as sufficiently near to the "ordinary temperature," we may take it that according to the determination of Hartley and Barrett a saturated solution prepared under usual conditions will contain 4 of water and 1 of true sulphite, or 3 of water and 2 of the crystallised sulphite —"B J" (from "Journ Chem Soc"), Aug 20, 1909, p 643

After-Treatment of Negatives

REMOVING STAINS

Removing Silver Stains—A method which, used with a little skill, involves no risk to the negative is as follows —The negative is re-fixed in a bath made up with hypo, alum and sulphite, in which the gelatine will lose its adhesiveness and allow of any portion of the print which may have stuck to it being removed It is then thoroughly washed and dried, and laid on a perfectly flat base, such as a piece of plate glass covered with two or three thicknesses of paper If now firmly rubbed over with a tuft of soft cotton wool moistened with methylated spirit, the stain can be completely rubbed off, but the pressure needs to be hard and the movement circular, as in applying retouching varnish —"B J," Apr 9, 1909, p 278

Removing Oxidised-Developer Stain—R E Blake Smith first converts the silver image into chloride by means of a solution of potassium bichromate, sodium chloride and sulphuric acid, and then oxidises the stain (caused by oxidised developer) by means of acid permanganate solution the silver chloride image not being affected by this latter The deposit of manganese peroxide is removed with a solution of sulphite made acid with sulphuric acid, and then after further washing the image is re-converted into the metallic state by means of a "developer" of metol, soda sulphite and soda carbonate,

The following are the solutions employed —

Potassium bichromate	65 grs	15 gms
Conct sulphuric acid	400 mins	90 c c s
Common salt	1 oz	100 gms
Water	10 ozs.	1000 c c s

The negative is washed till no yellow colour shows, and then it is immersed for between five minutes and a quarter of an hour in

Potassium permanganate	6 grs	2 7 gms
Sulphuric acid conct	30 mins	14 c c s
Water	5 ozs	1000 c c s

It is then washed in running water for two or three minutes, and then treated with

Sodium sulphite (cryst)	6 grs.	4 3 gms
Conct sulphuric acid	8 mins	5 8 c c s
Water	3 ozs	1000 c c s

The potassium permanganate bleaches out the developer stain, but leaves in its place a manganese one and this is removed by the sulphurous acid

The negative is now washed for about ten minutes in running water, and then redeveloped with

Metol	30 grs	6 8 gms
Sodium sulphite	90 grs	20 5 gms
Sodium carbonate	1 oz	100 gms
Water	10 ozs	1000 c c s

—B J ," Feb 5, 1909, p 100

INTENSIFICATION

Intensification of Dry-plates with Silver —In order to obtain a silver image in a state readily amenable to physical development with an acid solution containing silver nitrate and a developer such as pyrogallic acid, R. E Blake Smith directs that the negative, after soaking in water, be bleached in a mixture of potassium bichromate, sodium chloride, and sulphuric acid, washed again, the last traces of bichromate removed with acid solution of sodium sulphite, and the plate, whilst still wet with this solution, exposed to diffused daylight for about an hour

The formulæ for these two solutions are —

Potassium bichromate	65 grs	19 4 gms
Conct sulphuric acid	400mins	90 c c s
Common salt	1 oz	100 gms
Water	10 ozs.	1000 c c s.

and after bleaching is complete it is washed The bleaching solution keeps well, and after use it should be poured into a bottle, corked up, and stored for future employment.

The bleached negative, after all the bichromate solution has been washed out of it, is put into a dish containing

Sodium sulphite (cryst)	15 grs	6 8 gms
Conct sulphuric acid	25 mins	11 4 c c s
Water	5 ozs	1000 c c s,

It is then washed briefly, and either forthwith intensified or first redeveloped with a metol developer, the latter course being preferable on account of it then being easier to judge intensification exactly After redevelopment the plate is washed for a few minutes, given a bath of 1 200 hyrochloric acid to remove deposit of lime salts due to the washing water, and again washed It is then intensified in a solution of

Pyrogallic acid	2¼ grs	1·25 gms
Silver nitrate	9 grs.	4 1 gms
Citric acid	70 grs	32 gms
Water (tap)	5 ozs	1,000 c c s

until of the required density Should any yellow stain appear on the negative a momentary immersion in the bleaching bath of bichromate, sodium chloride, and sulphuric acid will at once remove it without reducing the silver image -- "B J," Jan 29, 1909, p 82

Stains in Chromium Intensification —Sometimes when a plate is put through the chromium intensification process the final result shows brown stains, especially where finger marks existed on the original These stains, particularly when due to the existence of grease on the negative, are easily removed if the plate is first soaked in a solution of sulphite of soda and hydrochloric acid, and then rubbed with a wad of cotton wool The slighter stains will rub off immediately, while the stronger ones will yield to two or three applications of the solution Incidentally the solution will slightly reduce the intensification obtained, and for this reason it is better to soak the whole plate than to merely apply the solution locally The reduction is, however, not very great in any case, unless a great deal of acid is used, and three or four drops in 2 ozs of 5 per cent sulphite solution are usually quite enough — "B J," June 18 1909, p 470

REDUCTION

Reducing by Redevelopment —R E Blake Smith recommends the following as a method of reduction when it is required to reduce the darker parts of the negative without affecting the lighter ones The negative is bleached in

Potass bichromate	65 grs	19 4 gms
Sulphuric acid, concentrated	400 mns	90 c c s
Common salt	1 oz.	100 gms
Water to	10 ozs	1000 c c s

This bath is diluted with three or four times its volume of water for use

The negative is allowed to remain in the diluted bath until the lighter portions are completely bleached and the darker portions partly so, these latter being left with an amount of unchanged silver in them corresponding with the degree of reduction desired After washing, the plate is put in a reducing bath, which will not dissolve the silver chloride For this purpose the acid permanganate reducer

or the Lumière ceric sulphate reducer may be used, after which, and a further wash, the negative is re-developed in

Metol .	15 grs	6 8 gms
Sodium sulphite, cryst	45 grs	20 5 gms
Sodium carbonate, cryst	½ oz	100 gms
Water	5 ozs	1000 c.c s

—"Phot ," Feb 2, 1909, p 98

Soft-Working Farmer's Reducer—R Namias has stated that bromide added to the Farmer's reducer, as suggested by Piper ("B J A ," 1909, p 587), actually increases the contrast of the negative instead of reducing it His results, however, were obtained with a solution about one-tenth the strength of that employed by Piper "Phot Couleurs," Apr , 1909, p 87 —"B J ," May 14, 1909, p 374

Reducing with Persulphate by Time—R B Hughes recommends treating the negative with a solution of ammonium persulphate containing 12 grs of persulphate and 2 drops of sulphuric acid per ounce on a time basis A note is made of the time which elapses between the first application of the solution and the first appearance of the milkiness which marks the commencement of reduction A total period of four times this period of "first appearance" will then give an average amount of reduction The negative should be soaked in water for fifteen minutes before reduction, and the dish should be rocked whilst treating with the persulphate Two successive treatments in this way are said to be as much as any negative can stand —"Phot Monthly," Sept., 1909, p 207

NEGATIVE VARNISHES

De-varnishing Negatives—A very effective solution for removing shellac varnish from gelatine is made as follows, being based on the solubility of the varnish in the spirit and the power of ammonia or a strong caustic alkali to prevent precipitation of the shellac when the negative is placed in water —

Caustic potash	1 oz	100 gms
Methylated spirit	10 ozs	1000 c c s

The plate is soaked in this until the varnish has apparently all gone A second bath may be then applied for a few minutes, when the plate can safely be washed under the tap

If the plate is to be intensified with mercury, it is better to use 1 oz of ammonia, 0 880 in place of the caustic potash, as it is more easily washed out —"B J ," Oct 30, 1908 p. 826

Reproducing Negatives.

Quality in Enlarged Negatives—Dr D'Arcy Power, in an article on the relative merits, as regards result and convenience, of methods of making enlarged negatives decides in favour of that in which a perfect P O P print from the negative (he uses Solio paper) is made, and, without toning or fixing, enlarged on to a slow plate or thin bromide paper, which latter is then converted into an ozobrome to the improvement of its gradation The untoned and unfixed P.O P print is, of course, photographed by artificial light, preliminary

focussing having been done with a piece of newspaper in the place of the print A plate of medium rapidity, such as the 26X Seed, or a smooth "platino"-bromide paper is used for the enlarged negative, and a rather weak developer of the metol class employed In the case of the improvement of the paper negative mentioned above, the negative enlargement is used to give an ozobrome which is developed in contact with it by the ozobrome No 1, or non-transfer, process, using a tissue, or "plaster," of engraving black The result is found to be a negative of full density in the high-lights, good shadow detail, and with very little granularity owing to the filling of the pores of the paper by the gelatine Dr Power's method is probably as cheap as any —"Cam Craft," Jan , 1909, p 2

Enlarged Paper Negatives Direct—W L G Bennett uses the following ingenious method of preparing an enlarged negative direct. The minimum exposure is given to the bromide paper and development stopped at the point that would be right for a positive enlargement The paper is then washed for about two minutes, and, still unfixed and in the dark room, toned in a uranium toning bath. White light may be used for an instant to judge of the progress of toning The latter is done in a strong bath for about five minutes or for ten minutes in the case of a print with very deep shadows. Longer will do no harm The toned print is then washed in several changes of water and placed for one minute in

Ammonium sulphocyanide	20 grs	4 6 gms
Water	10 ozs	1000 c c.s.

It is then well washed for another two minutes The print is laid face up in an empty dish and exposed to 4 inches of magnesium ribbon burnt about 2 feet distant The print is then put back into the original developer, which destroys the uranium image (owing to the alkali in it), and at the same time develops a negative image printed on the underlying emulsion by exposure to the magnesium —"A.P ," Aug 24, 1909, p 181

See also "Contact Copies of Plans, etc ," under "Copying"

Duplicate and Reversed Negatives—Dr E Stenger gives a lengthy review of the methods available —"Zeit fur Repro," Mar , 1909, p 34.

Film Photography.

NEGATIVES ON FLEXIBLE SUPPORTS

Translucing Paper Negatives—J M Sellors, in a paper before the Croydon Camera Club, stated that of the three methods of applying wax to a paper negative, namely (1) By rubbing a hot iron over the paper with a lump of wax in contact with it, (2) by placing the negative film side down on a hot plate, and rubbing a lump of wax over it, and (3) by employing a shallow tin tray containing a thin layer of melted wax, kept fluid by placing the tray in a dish of boiling water, the negative being floated on to the wax, film up—the first was found to result in streaks and lines owing to uneven absorption of the wax The third method was satisfactory, the negative being afterwards ironed in order to remove any wax which came in contact with the emulsion side —"B J.," Apr 16, 1909, p 300

V.—PRINTING PROCESSES.

POSITIVES DIRECT

Copies by Reflected Light by Contact (Playertype) – See "Contact Copies of Plans, etc.," under "Copying."

Printing Methods and Accessories.

Strong Prints from Weak Negatives.—A. H. Hall, in comparing practicable methods for getting a vigorous print from an extremely weak negative suggests as the easiest method the making of a weak gaslight print, i.e., to give an exposure that is too short to obtain full density, but long enough to give full detail without veiling, and to intensify by the well known bichromate method, followed by re-development with amidol. For the development of the print, in the first case well restrained pyro-soda is best. Development will be somewhat slow, and unless the negative is quite abnormally thin, full density can often be obtained without any further manipulation. The print may be of a pleasing sepia, but is more likely to be a most unpleasant greenish black. It is, therefore, better to stop development before full density is obtained, and intensify as suggested above, when the resulting print will be found to be a pleasing black.

A method that gives even finer results, but is rather more trouble, is to make a weak print, harden it, and make an ozobrome on top of the image so formed. The print should then be dried, and when dry, the underlying image can be re-developed with amidol or toned in the sulphide bath. Very fine results can be obtained by this means. A sepia bromide on a print that has been re-developed with amidol gives a very fine warm black. The secret of both these methods is to get a print in the first place that has no signs of veiling, yet is as strong as possible. This entails several trials to get the exact exposure.—"A. P.," Dec. 1, 1908, p. 527.

Pipe Dream Photographs.—W. R. Barefoot recommends as a business novelty for the portrait studio a form of vignetted photograph in which the head of the sitter is represented as forming part of the cloud of smoke from a tobacco pipe. This is done by first vignetting the head near the top of a 9 × 14 sheet of paper—

best, platinum paper The pipe itself is printed towards the bottom of the same sheet. The print having been developed, fixed and dried in the ordinary way, the cloud or smoke effect rising from the pipe and enveloping the head is etched in with a piece of absorbent cotton and graphite, being softened off with ordinary soft rubber — "St L and C Phot," Feb., 1909, p 102. "B. J," May 14, 1909, p 383

Washing Under the Tap —The following dodge will be found to allow of more efficient washing being given to a batch of prints which are washed by allowing the tap to run on them as the prints lie in a dish —Select a dish in which the sides slope outwards very slightly The majority of porcelain dishes have the requisite slope, and the only ones not suitable are those with quite vertical sides Arrange the dish so that a fairly strong stream of water falls vertically on the centre of one of the shorter sloping sides If the water in the dish is stained a port wine colour with permanganate, it will be found that the whole of the colour in a 10 × 8 dish will disappear in two minutes or less This is the test for efficiency in changing the water Then place twenty or thirty quarter-plate prints in the dish If the water is running with a sufficient force, the whole will keep constantly on the move, each print continually changing its position, and never clinging to any other print — "B J," July 30, 1909, p 586

Photographic View Postcards —C W Jerome, in recommending the making of view postcards as a profitable branch of photographic business, gives suggestions as to the most suitable subjects and the best methods of turning out high-quality cards —"Wilson's," Apr, 1909, p 171 "B J," Apr 23, 1909, p 323

Adjustable Vignettes —H E Corke describes a form of vignetting card, the method of preparing which allows of very nice adjustment of the negative, while at the same time it leaves the negative untouched Place the negative in a printing frame as usual, and as a precaution firmly attach the negative to the printing frame with small pieces or strips of gummed paper Then take a piece of thin cardboard and cut a hole in the centre, just as in making an ordinary serrated shape, but pay no regard to the actual shape of the hole, which should, however, be a good deal larger than the actual size of the proposed vignette This card is then attached to the front of the printing frame with drawing pins Next paste a piece of tracing paper over the hole, procure some opaque paint, such as yellow ochre or Indian-red, and mix into a thick cream with water and ordinary office gum Then, while holding the printing frame up to a window or to a gas flame, and looking through the negative, as if using a retouching desk, we can apply the paint to the tissue-paper, working backhanded, as it were It will thus be seen that the utmost precision is possible as to the actual shape The edges of the vignette can be made to register more softly by either applying the innermost line of paint less thickly, or by making uneven brushmarks, similar to rough serrations For

the purpose of local control of printing density also, this same method is extremely valuable Any part of the negative which prints too darkly can be effectively restrained by the application of a dab or two of colour on the tracing-paper —"A P," Mar 23, 1909, p 280

Panoramic Views from Several Negatives—R A Towers, in making one long panoramic print from a series of negatives specially taken for the purpose, directs cutting a slot with a keyhole saw in the end of the printing frame so as to enclose the projecting portion of the long strip of paper in a bag or envelope (Fig 1) In order

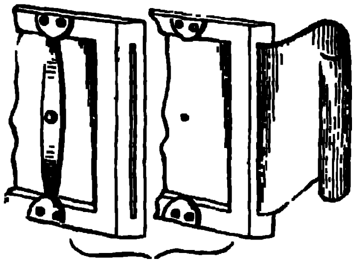


FIG 1

to combine the negatives in such a way that the joins do not show, cards of the saw-like pattern shown in Fig 2 are fixed to each side of the frame The printing is done in the shade or under two thicknesses of tissue paper pasted over the front of the frame This method will allow of the separate pictures being combined

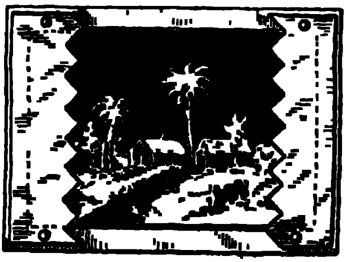


FIG 2

without showing any sign of join It is necessary in taking the negatives that at least one inch of the subject should overlap on each negative otherwise an even join cannot be obtained. The negatives are, of course, all taken with the same focus lens, and in dividing up the subject it is well to choose spots where the out-

lines are irregular—that is to say, trees in preference to buildings, when, as is usually the case, both occur in the subject The method is applicable to developing papers as well as to those which print out; in the former case the adjustment is made by ruby light, a light sketch of the outline being pencilled on the back of the paper at the point of junction as well as of the masked off edges at top and bottom A similar method may be used when enlarging, but in this case a pencil may be used lightly on the surface of the paper, the marks being easily removed from the wet paper with the finger—"Cam Craft," Feb, 1909, p 43; "B J, Mar 19, 1909, p 214

Plain Paper.

Plain Paper for Black and Brown Tones—Dr C Sturenburg gives the following formulæ —

For a paper which shall give a black tone 10 gms of sodium phosphate and 20 gms of gelatine are dissolved in 1,000 ccs of water To this warm solution 10 ccs of a 5 per cent solution of shellac in alcohol are added The paper to be used is dipped in this warm solution and removed and hung up to dry as soon as the liquid has penetrated it In place of immersion the solution may be applied with a brush, and the dried paper can be kept for any length of time. In order to sensitise it the following silver bath is prepared .—

Silver nitrate	120 gms	105 grs
Boric acid	10 gms	88 grs
Potass chlorate	20 gms	176 grs
Water	1000 c.cs	20 ozs

The paper is floated on this bath for about five minutes and hung up to dry Printing takes place very quickly, and the prints are then washed and placed in a plain bath of hypo of 10 per cent strength, again washed and dried

A second method (for brown-toned prints) is as follows —

Soft gelatine	10 gms	154 grs
Ammonium chloride	6 gms	93 grs
Sodium carbonate	2 gms	31 grs
Borax	11 gms	170 grs
Sodium phosphate	6 gms	93 grs
Potass bichromate, 10 per cent solution	3 drops	3 drops
Water	300 c cs	10½ ozs

The above proportions give a deep brown tone For a black tone only 8 gms (125 grs) of borax should be taken and 9 gms (140 grs) of sodium phosphate For sepia tones the proportions should be borax 15 gms (½ oz), sodium phosphate 2 gms (30 grs)

This warm solution is applied freely to the paper by means of a brush, the paper being pinned to a board After drying, the paper is sensitised in :—

Silver nitrate	15 gms	½ oz
Lead nitrate	15 gms	½ oz
Distilled water	240 c.cs	8½ ozs,

Ammonia is added drop by drop to this bath until a slight permanent precipitate is produced The bath is then exposed to light until the precipitate has settled and is then filtered The paper may be sensitised by liberal application of the solution with a brush In its sensitive condition the paper will keep a few days. It may be fairly deeply printed, and the prints then given a few minutes in a 3 per cent solution of salt, rinsed, and fixed in a hypo solution containing 180 gms hypo per 1,000 ccs of water (3½ ozs in 20 ozs) This is followed by the usual washing —"Der Phot," Apr 13, 1909, p 117, "B J," May 14, 1909, p 382

GELATINE AND COLLODION P.O.P.

GELATINE P O P.

Emulsions

Contrasty P O P Emulsion —A patent of the Chemische Fabrik auf Actien (E Schering) describes the preparation of a P O P emulsion suitable for the making of strong prints from very weak negatives In place of the chromates or ferricyanides used for such papers a salt of vanadic or phospho-vanadic acid is used with the advantage that the paper is white, not of the yellow-brown colour of emulsions containing the above mentioned compounds The white paper allows of printing being readily judged The print is treated as usual in a toning and fixing bath

An emulsion may be made by successively stirring in thin streams of the three following solutions in order into a solution of 150 gms of gelatine in 1,400 ccs of water

I.	Citric acid	35 gms	1¼ ozs
	Sodio potassium tartrate (Rochelle salt)	3 gms	46 grs
	Water	150 c c s	5¼ ozs
	Ammonium vanadate	2 gms	30 grs
II	Ammonium chloride	8 gms	¼ oz
	Water	50 c c s.	1¾ ozs.
III	Silver nitrate	50 gms	1¾ ozs
	Distilled water	200 c c s	7 ozs.

The ammonium vanadate in the example may be replaced by from 3 to 5 gms (46 to 80 grs) of ammonium phosphovanadate if this substance be used —Eng Pat No 9,275, 1908, "B J," Jan 8, 1909, p 28

Emulsion for both Development and Printing-out —W H Caldwell has patented the addition to an ordinary gelatino-bromide or chloride emulsion derivatives or salts of hydrazine or hydroxylamine, with the object of providing substitutes for the organic salts of silver (halogen absorbents) in a print-out emulsion, and at the same time of allowing of the emulsion being developed in the ordinary way (presumably with an alkaline developer). A suitable addition to the prepared and boiled emulsion is neutral hydrazine sulphate hydrazine phosphate sulphite or other easily oxidisable salt of

hydrazine In making these salts a solution of the acid is added to hydrazine hydrate, using methyl orange as an indicator of the neutrality In the case of chloride emulsions which require only a mild halogen absorbent, a sulphite of a base such as methyl hydrazin is used In emulsions containing the more stable silver bromide, a more active compound such as hydrazin phosphite is used The proportion added is based on the fact that each molecule of hydrazin hydrate is able to reduce four molecules of silver haloid Plates or papers prepared with ordinary emulsions may be treated with a bath of the hydrazine or hydroxylamine compound —Eng Pat No 1689, 1908, "B J," Feb 19, 1909, p 145.

TONING P O P

Thiocarbamide Toning Bath.—A and L Lumière have attempted to use thiocarbamide and thiosinamine as substitutes for hypo in combined toning and fixing baths, the object being to avoid the liability to impermanent results caused by decomposition of the hypo It was found, however, that thiocarbamide attacks the gelatine, and therefore cannot be used in stronger solution than 6 per cent, although its action is to some extent counteracted by addition of alum The chief drawback is that traces of either thiocarbamide or thiosinamine in the print are decomposed by the alkali present in most tap waters If such combined baths are used it would be necessary to wash prints first in distilled water or in 1-10th per cent acetic acid The best toning bath was found to be one containing only —

Thiocarbamide	60 gms	530 grs
Alum	30 gms	265 grs
Gold chloride	6 gm	5 grs
Water	1000 c c s	20 ozs

This toned in six minutes, and did not work so well with addition of a lead salt, which altered the half-tones of the prints —"B J," Oct 9, 1908, p 776

Thiocarbamide Combined Bath —Dr C Arnold recommends the following formula as the simplest and a most reliable one for a combined toning and fixing bath —

Thiocarbamide	10 gms	88 grs.
Hypo	200 gms	4 ozs
Water	1000 c c s	20 ozs

Gold chloride is added in the requisite proportion, say, 2 grs of gold per 20 ozs of bath The bath gives reddish to black tones according to time of immersion, and prints may be left in it for any reasonable time without detail suffering —"Phot Mitt," Heft 11, 1909, p 174, "B J," July 9, 1909, p 526

R E Blake Smith points out that it is quite safe to wash prints toned in the above bath in ordinary tap water, so long as the hypo is greatly in excess of the thiocarbamide There is no need to employ a weak acid bath for the first washings, since no silver

thiocarbamide compounds are formed in the prints in normal circumstances This may not be the case if the bath has taken up much silver —"B J," July 16, 1909, p 562

Fixing Prints before Toning in the Combined Bath —R Namias recommends the fixation of prints before toning in any combined bath on the grounds of greater permanency and regularity of working The fixing bath advised is the following —

Hypo	300 gms	6 ozs.
Boric acid	50 gms	1 oz
Water	1000 c c s	20 ozs

A good P O P print will be fixed in three or four minutes, and will not be weakened any more than when using the combined bath in the ordinary way. The latter bath tones fixed prints rather more slowly, but the silver finding its way into the bath is so small that it does not affect the action until several hundred prints have been fixed, as compared with dozens in the ordinary way The bath thus keeps much better, does not darken, and gives a full toning action on occasional strengthening with gold chloride solution —Eder's "Jahrbuch," 1908, p 72, "B J," Nov 20, 1908, p 886

Combined Bath for Ilford P O P – H W Bennett recommends the following formulæ and method for the preparation and use of a combined bath giving very rich purple and permanent tones with Ilford printing-out paper

Each constituent of the bath will keep in solution satisfactorily for a very long time —

A	Hypo	1 lb	500 gms
	Water, sufficient to make	32 ozs	1000 c c s
B.	Ammonium sulphocyanide	2 ozs	57 gms
	Water to	8½ ozs	230 c c s
C	Lead acetate	1 oz	28 gms
	Water to make	8½ ozs.	230 c c s

The lead acetate should be dissolved in very hot water, as nearly boiling as possible The solution will be cloudy, and should be shaken up before measuring out any quantity required

D	Gold chloride	15 grs	1 gm
	Water	3 ozs	85 c c s
E	Ammonia (880) .	3 drs	10 6 c c s
	Water	10 ozs.	280 c c s

To prepare the toning bath, take 3 ozs (85 c c s) of A and 3 drs (10 c c s) each of B, C, D, and E, and add sufficient water to make the total quantity up to 10 ozs (280 c c s) This quantity of bath is sufficient for eight whole-plate prints, for fifteen half-plate, or for thirty-two quarter-plate

It is very important that the solutions should be mixed in the order of the letters of the alphabet The necessary quantity of A should be taken first, B added next, then C, and so on After measuring C, the measure must be thoroughly rinsed before using it for D, and again thoroughly rinsed before measuring E

The minimum time for the prints to remain in the bath should be twelve minutes This is most important to ensure perfect fixation, and, consequently, stability

Very deep printing is necessary for toning and fixing in this bath The tone is judged as the prints lie in the solution, the final colour being that which they have at the time of being taken from the bath "Phot Scraps," Feb, 1909, p 11, "B J," Feb 5, 1909, p 104.

THIOMOLYBDATE TONING

Sepia Tones with Thiomolybdate —Harry E Smith has found that the thiomolybdates patented by him for use in sulphide toning of bromides (see under "Toning Bromides") serve well for the toning of print out papers Prints on these latter are first fixed in hypo, in which they become a yellowish-brown colour, washed and then treated with the toning bath of about ½ per cent strength of thiomolybdate They are then immersed, after rinsing, in a weak ammonia bath –

Ammonia, 0 880	3 to 5 c c s	½ to 1 oz.
Water	100 c c s	20 ozs

—for about two minutes to clear the whites of the picture A final wash of fifteen minutes completes the process

With most papers it is best to wash the print before fixing in running water, and then to give them a few minutes in a 10 per cent bath of common salt, again washing before passing to the hypo bath —Eng Pat No 12,341, 1908, "B J," Mar 19, 1909, p 220

H E Smith has further improved this process by placing prints from the frame in a bath of ammonium phosphate and ammonium carbonate This prevents any possibility of the high-lights yellowing in time, although even without this precaution many papers will not show this defect The bath is prepared as follows —A stock solution of ammonium carbonate is first made –

A —Ammonium carbonate	400 gms
Cold water	1,800 c c s
Ammonia, 0 880	600 c c s

The phosphate-carbonate bath is –

Ammonium phosphate tribasic (10 per cent sol)	3 parts
Ammonium carbonate, A sol	1 part

This is allowed to act for ten minutes, and prints are then put straight into hypo fixing bath made as follows –

Hypo solution (3 ozs. per pint) .	4 parts
Ammonium carbonate, Solution A	1 part

After having been fixed for fifteen minutes, prints are washed for one hour and toned in the thiomolybdate bath prepared from the "Cubrome" thiomolybdate of Edmund and Co —"Phot Journ," Aug, 1909, p 330, "B J," Aug 20, 1909, p. 646.

Although tri-basic ammonium phosphate is a commercial salt, it is sometimes difficult to obtain, and may then be prepared, as directed by H. E Smith, as follows —

Dissolve the ordinary ammonium phosphate in cold distilled water nearly to saturation, and then add excess of 0 880 ammonia After standing a short time, the contents of the flask, after being shaken up, is thrown on a Buchner funnel, when the precipitated salt is dried as far as possible by suction with the filter pump The salt in this state (a somewhat pasty crystalline mass) is dissolved (1-10) in distilled water To every 3 parts of this solution 1 part of the ammonium carbonate solution is added to make the alkaline phosphate bath, as already described above —"B J," Aug 27, 1909, p 678

[The use of thiomolybdates and allied salts for bromide and gaslight prints, etc, is patented, and the use of these salts for toning P O P is also separately patented thus as mentioned above The thiomolybdate solution must be obtained from the proprietors of the patent, Messrs Edmund and Co, Ed B J A]

DEVELOPING P O P

"Ensynoid" Developer for P O P—J Peat Millar finds that the "Ensynoid" liquid developer, 4 drops in 1 oz of water, or a developer made by dissolving one A and one B "Ensynoid" tablet in 32 ozs of water, forms a developing solution for faintly printed "Imperial" or "Ilford" P O P Prints developed up well without surface stain, though with markings on the backs The developer brings up the prints to full vigour, but the tone after fixing is of disagreeable greenish colour, which can, however be modified by gold toning - B J," July 9, 1909, p 537

Carbon Surface on P O P Prints—W Findlay mentions a precaution that should be taken in using formaline for hardening gelatine prints which are to be squeegeed on to and stripped from ground glass The formaline bath should be given to the prints immediately before squeegeeing, otherwise, if the print partly dries before squeegeeing its surface is so altered that it will not assume the silky carbon-like appearance on stripping from the ground glass —"Photo-Era," Jan, 1909, p 26

Impure Alum and P O P—A sample of alum found by a correspondent of the "B J" to cause pronounced eating out of the highlights of a P O P print, which had been toned in the separate gold and sulphocyanide baths, whilst in the case of a print toned in the combined bath the image was almost removed, was found to be contaminated with iron salt The iron existed in both the ferrous and ferric states, the latter no doubt giving rise to the reducing action —"B J.," July 16, 1909, p 546

Collodion P.O.P.

Platinum-Gold Toning—Dr G Hauberrisser recommends the use first of a platinum bath of the usual kind, followed (after thorough washing) by combined toning and fixing in a solution prepared as follows —

Gold toning and fixing salt, Bayer	1 oz	50 gms
Hypo	1 oz	50 gms
Water	15 ozs	750 c c.s.

Here the prints remain at least 8 minutes, during which time they attain a pure black tone They are finally washed for an hour or more —"Phot Rund," Heft 15, 1909, p 184, "B J," Aug 27, 1909, p 668.

Phosphate Printing Papers.

ENSYNA PAPER

This quite new description of photographic printing paper was placed upon the market by Messrs Houghtons immediately after the date of publication of the 1909 "Almanac" Although worked by gaslight the paper is quite distinct from the numerous "gaslight" papers As stated on the packages, it is made in accordance with the patents of York Schwartz, Nos 9,993, 1908, and 9,855, 1907 ("B J A," 1909, p 599) Developer is issued under a patent of J H Mallabar No 13,032, 1905 ("B J A," 1907, p 784) The basis of the paper is silver phosphate, the invisible image on which is developed by a physical developer Thus, an ordinary "gaslight" developer is quite useless for "Ensyna," which is more akin in its method of treatment with the wet collodion plate As regards, however, the practical facilities which the new paper provides, it may be said that "Ensyna" gives the effects of P O P (in a more permanent form) by the "gaslight" method But as it is much more rapidly finished off than a gaslight paper, and as it dispenses with gold or platinum toning it is more to the point to say that it gives (by gaslight) prints which are emble (but have greater claims to permanence than) those on self-toning papers, by a method of production which is as expeditious as the "development" and clearing of platinotype prints The salient features of the paper are (1) the great range of tone given by it from bluish black through brown and sepia to a Bartolozzi red, (2) the fact that the only effect of over-exposure is to give the print a warmer tone, and (3) the very soluble nature of the film, which allows of fixing being complete in half a minute and the final washing in 2 minutes In addition to the above the image, since it consists of developed silver, has every claim to be regarded as fully permanent The rapidity with which a single print may be taken off on "Ensyna" may be thus shown —

Exposure	say 0 min 30 sec
Water bath	say 1 min 0 sec
Development	say 2 min 0 sec
Fixing	say 0 min 30 sec
Washing	say 2 min 0 sec
Total	6 min 0 sec

The method advised by the makers is to cover the paper first with water until it is limp to then pour off and apply a small quantity of the developer, which is used to bring the print to a point a little short of full vigour and is then thrown away A little water is then again poured on and the print removed when it has reached the desired strength, being then transferred to the fixing bath, which may be of plain hypo, but is preferably of the "acid" variety

Owing to the speed of fixing, the print is ready for removal almost immediately, so that working in this way there is only one print at a time in the hypo bath Longer washing than two minutes does not in any way injure the print, but this brief period is described by the makers as sufficient, not, we imagine, because every minute trace of hypo is removed in this time, but for the reason that the developed silver image is unaffected by faint residues of a fixing salt in the paper This claim is certainly confirmed by the well-known immunity of properly fixed bromide prints to hypo which is left in them owing to a very brief washing By dipping an undeveloped piece of "Ensyna" in the fixing bath the great solubility of the emulsion will be seen from the almost instantaneous disappearance of the yellow colour On allowing the sheet of paper to lie in the air the portion dipped in the fixer will show no discoloration, except at the line of junction with the unimmersed portion Here the local excess of silver causes decomposition and separation of silver sulphide, but the test shows the rapidity of action of the fixing bath and bears out what one would expect from the great solubility of silver phosphate in hypo solution —"B J," Dec 11, 1908, p 951

A new brand of the paper was issued under the name of "Vigorous" Ensyna by Messrs Houghtons in August, 1909 It gives prints of greater contrast, whilst at the same time considerable over-exposure results in a softer print of warm tone being obtained The new brand is thus more suitable for negatives of widely different character —"B J," Aug 6 1909, p 616

Fixing Exposures for a Given Colour —W Foster Brigham, in some notes on the professional use of "Ensyna" paper, recommends that a good clear average negative be chosen as a specimen, and from it a series of ten prints made with exposures, at one foot from the incandescent burner, of ten to one hundred seconds These are mounted in their consecutive order and hung in the printing room If we wish to get an exact shade of colour from any negative, we note how many seconds the average negative required for this, and make a test exposure on ordinary bromide paper, using, of course, the usual bromide developer and different dishes and measures to those reserved exclusively for the acid solutions of the newer paper Supposing our average negative required one second at three feet from the gas and the new one required three seconds, we know exactly the exposure for the particular colour required For it must be remembered that the density of the bromide image depends absolutely on the exposure With "Ensyna," however, the exposure has no effect on density, and very little on gradation, so that if it matters little what colour we get all preliminary tests may be dispensed with, and the prints exposed straight away It is impossible for any professional printer to inadvertently under- or over expose this paper.—"B.J," Jan 1, 1909, p 4.

Developing Formula —"F G" has found that a suitable developer may be made by dissolving 2 grs each of pyro and acetone sulphite in 1 oz of distilled water It is rather slower than th

special developer of the makers If used half strength, a warmer brown tone is obtained —"Pharm Journ," Mar. 6, 1909, "B.J.," Mar. 12, 1909, p 203

H G. Bailey and T J Ward state that the metol developer given for the Paget "phosphate" paper (see below) acts satisfactorily with "Ensyna," the only difference being that the time of development is about twice that required when employing "Ensynoid" developer. —"Phot," Aug 17, 1909, p 143

Remedying Developer Stains on "Ensyna" Paper —A D Weir points out that omission to use fresh developer for each print as directed by the makers may give rise to stains A solution of potassium bromide and potassium ferricyanide bleached the prints, and on re-development with metol-hydroquinone they were restored to their original chocolate colour, but *minus* the purple stains They had lost slightly in depth, so the method would seem to be a safe way to reduce an over-developed print, as well as to get rid of stains —"Phot," Feb 9, 1909, p 110

Changing "Ensyna" Prints from Purple to Brown —F Airey finds that the purple tone of an "Ensyna" print can be converted into one of a fine brown or sepia very simply A kettle is arranged so as to send out a good jet of steam, and the finished print, which must be perfectly dry, is held in this jet an inch or two from the spout for about thirty seconds The print must be kept moving the whole time, and if the kettle is on a fire the print should be protected from the dry heat as much as possible The process is effective, even after the prints have been mounted Brown tone prints do not give such satisfactory results when steamed as do those of a purple tone The process succeeds best with the matt surface paper, the steam leaving it with a satin or carbon surface —"Phot," Jan 19, 1909, p 56

Printing Out "Ensyna" —J Peat Millar finds that "Ensyna" paper printed-out to full vigour under a strong negative gives a satisfactory print Used in this way the paper gives soft results, and is, therefore, of service in taking a print from a hard negative. Printing requires to be deep, as there is a loss of vigour in the fixing bath, into which the print is placed direct from the frame The colour of prints so made is a good brown —"B J," July 9, 1909, p 537.

"Ensynoids" as a Developer of P O P —See under "Developing P O P"

PAGET "PHOSPHATE" PAPER

A new paper placed upon the market by the Paget Co in July last (1909) is presumably manufactured with an emulsion of silver phosphate Its rapidity is akin to that of gaslight paper, whilst the

effects produced by development are those of gold-toned P O P The developer is made up from the following stock solution —

Metol	¼ oz	7 gms
Acetic acid B P	3 ozs	85 gms
Water to make	20 ozs.	570 c c s

For use with ordinary negatives 1 oz of this stock solution is diluted with water to 20 ozs For extra contrast the 1 oz is diluted only to 10 ozs, or even to 5 ozs.

This is for purplish and sepia tones For more reddish tones the following is used —

Metol	¼ oz	7 gms
Citric acid	¼ oz	7 gms
Water to make	20 ozs	570 c c s

One part of this is diluted with nine parts of water

With short exposure an almost blue-black print is produced, whilst longer exposure gives purplish brown, reddish-brown, and sepia The paper is exposed behind a negative either to daylight for a few seconds, to incandescent gas for about a minute, or to one to two inches of magnesium ribbon burned at 12 inches from the printing frame The developer is poured over the print as it comes from the frame, and the image builds itself up gradually, attaining full vigour in from one to three minutes The print is given a brief rinse, fixed for half to one minute in a weak acid hypo fixing-bath, and placed to wash for a time, which need not be longer than half an hour, and may possibly be much shorter

The range of tones is governed by the exposure, and the degree of exposure is seen roughly by the readiness with which the print develops With the minimum exposure which can be given an almost blue-black print is obtained, closely resembling that obtained with metol-hydroquinone on a gaslight paper If exposure is cut down below the time necessary for this result the effect is to fog the print in the course of the protracted development necessary to bring out the image As a further degree of exposure is given, tones are obtained first resembling those obtained on P O P by gold-toning and then of a warmer brown or sepia It will be noticed that as a fuller exposure is given the contrast of the print obtained is less, but if full vigour is required in a warm-toned print all that is necessary is to use the developer at a lesser degree of dilution. In a word, short exposure with normal weak developer gives cold and purplish tones and full contrast, full exposure and normal weak developer gives soft prints and warm colour, and full exposure with stronger developer gives warm prints of full contrast It is thus seen that the process allows of the worker readily adjusting his conditions to the character of his negatives. Any prints over-developed readily reduce in a weak Farmer's reducer, whilst any which may be finally obtained of too warm a tone are easily converted to a colder colour by five or ten minutes' immersion in an ordinary combined toning and fixing bath The prints undergo no alteration as regards colour or depth in fixing. On drying the warm tones cool somewhat, a print which looks yellowish whilst wet drying to a very pleasing brown

The paper fixes very rapidly in a bath of hypo containing one-sixth the weight of hypo of metabisulphite, and need not be washed for a longer time than half-an-hour —"B J," July 30, 1909, p 599.

Washing Phosphate Prints —H G Bailey and T J. Ward find that, in the case of both "Ensyna" and Paget papers, it is important that the final washing of the prints should take place in running water, as if left to soak in a dish, even after ten minutes' washing, there is enough "hypo" remaining to destroy the image completely if left soaking for another hour or so. This has been found to be the case both with ordinary "hypo" (15 per cent.) and also with the "Ensyna Acid Hypo"

They also find that washing for 30 mins even in running water does not completely remove hypo (¼ to ½ gr remaining in a quarter-plate print) While this may not affect the phosphate prints themselves, the hypo may act on other prints with which they are stored —"Phot," Aug 17, 1909, p 143

"*Wisto*" *Paper* —A new paper, invented by Mr B J Edwards, has appeared upon the market under this name It is of gaslight rapidity, and the faint image produced by a few seconds' exposure to daylight is developed by about two or three minutes' immersion in a solution made by dissolving the special salt supplied by the maker The image appears first as a pale lavender-grey, which changes to a bright red, further development then causing the tone to change first to a warm, and next to a cold, sepia A considerable range of colours is thus obtained, there being a certain correct exposure for a print of correct depth and given colour, but if for a certain colour, say cold sepia, the period of development (as a result of insufficient exposure) gives an over-dense print, a weak Farmer's reducer of hypo and ferricyanide will bring back the print to a proper depth without perceptibly altering the colour —"B J.," July 23, 1909, p 578

Bromide and Gaslight Papers.

BROMIDE PAPERS

Tentative Development of Bromide Paper —T. H. Greenall recommends the following method for dealing with bromide exposures which may not be correct The colour of the print will vary in the case of the longer exposures towards a brown-black, but, as regards gradation, exposures of five and thirty seconds respectively will give prints almost equal

The solutions used are as follows —

A	Pyrocatechin	60 grs.	6 8 gms
	Sulphite of soda	120 grs	13 7 gms.
	Potass metabisulphite	24 grs	2 7 gms
	Potass bromide	20 grs	2 3 gms.
	Potass. carbonate	300 grs	34 0 gms
	Water	20 ozs.	1000 c c s.

This solution may be used repeatedly

B	Eikonogen	80 grs	9 1 gms
	Soda sulphite	320 grs	36 5 gms
	Water ..	20 ozs	1000 c c s

This solution contains no alkali It will keep, in a full bottle, and may be used repeatedly if the prints are rinsed back and front before immersion In practice the prints are placed in A solution, the dish covered and rocked occasionally, and the prints kept properly covered with solution At the end of 6 to 9 minutes, according to temperature, they are examined, and those which show little or no image are taken out, rinsed back and front, and transferred to the B solution, in which they will develop quite satisfactorily unless, of course, the exposure has been hopelessly short They are then put to fix, and the prints remaining in the A solution are again examined Some of these will appear nearly finished, excepting that detail is lacking in the high-lights These are taken out, rinsed, and given a shorter time in the B solution, which will bring out the detail in the high lights if it is at all printable, whilst others of the prints, and these are the maximum exposures, will require none of the B solution, which, indeed, would veil them, but will yield good prints in the A solution alone, in a total of 12 to 20 minutes, according to temperature and other conditions, and provided the exposure has not been greater than 6 times the minimum

Plenty of yellow light is needed use yellow tissue paper behind which is an incandescent gas jet This will fog some of the very rapid bromide papers unless used with caution In dealing with varied negatives give a flat one a short or medium exposure and long development in the A solution, whilst give a contrasty negative a full exposure, followed by short development in A solution and relatively more in the B Bear in mind that other bromide papers may require some modification in the A solution, or in the time of development, and that the very rapid ones will be likely to show least latitude and most liability to fog The carbonate of potash recommended is of "B P" quality, which is good and cheap It does not keep well in powder, but makes a permanent 50 per cent solution An acid fixing bath must be used Finally, the prints may be sulphide toned if desired —"Photo Notes," Apr, 1909, p 64; "B J," Apr 16, 1909, p 307

Acid Diamidophenol Developer —M G Underberg strongly recommends this developer for both gaslight and bromide papers on account of its non-fogging qualities and of the absence of greenish shadows, and freedom from stains Moreover, a single formula may be used for all brands of paper —

Solution S* .	½ oz	15 c c s
Diamidophenol	8 grs	0 5 gm
Solution BB*	85 to 135 mins	5 to 8 c c s
Water to make	3½ ozs	100 c c s

* See under "Developers," "Negative Processes.

A greater or less quantity of the bisulphite solution is used according to the slowness with which the developer is desired to work. With 8 c.c.s. (135 mins.) a fairly restrained developer is obtained, and this quantity should be employed in summer. In winter, when the lower temperature itself restrains the bath, 6 to 7 c.c.s. are used (100 to 120 mins.)

The paper is immersed in the developer and the film side gone over with a piece of soft cotton wool, which removes air-bells. There is no need to place the paper first in water. The acid bath by its steady action, does not give rise to stains, and very rarely to white spots due to minute air-bells. If the image happens to come up too slowly it is well to turn it over face down, by which action the development appears to take place more quickly. The formula given above may be further diluted up to 300 c.c.s. (10½ ozs.), such a dilution being particularly advisable in the case of enlargements, where softness is desired, or where it is found necessary to resort to local development. For this latter a camel's hair brush is dipped in solution BB more or less diluted. A thin image having been developed, the solution is poured off from the paper, and those parts which are to be held back gone over with the brush, after which the developer is re-applied. By repeating this operation several times the desired degree of restraint may be obtained without any fear of yellowness of the high-lights or of unequal action. After development the print is rinsed, fixed for at least fifteen minutes, washed, and put to dry.—"Photo-Revue," July 25, 1909, p. 25; "B. J.," July 30, 1909, p. 591.

Reducing Bromide Prints.—C. Harold Smith recommends the use of the Farmer reducer in two stages, a weak bleaching bath being first given to the print (for a time found by previous trial on a waste print in the case of slight reduction), after which the print is rinsed, placed in a bath of plain hypo (2 ozs. per pint) for ten minutes, and afterwards again washed. The bleaching bath is:—

Potassium ferricyanide (5 per cent. solution)	5 drs.	18 c.c.s.
Sodium chloride (common salt, 10 per cent. solution)	5 drs.	18 c.c.s.
Water .	20 ozs.	570 c.c.s.

It should not be used more than once, otherwise its regularity of action in a certain time cannot be depended upon.

The advantage of the method lies in the fact that the shadows of the print are reduced to a greater extent than the high lights, the more delicate tones thus being preserved. The colour of the print, too, remains unchanged.—"Phot.," Oct. 6, 1908, p. 449.

Prints in Greasy Ink from Bromides.—See "Miscellaneous Printing Processes."

GASLIGHT PAPERS

Prints in Numbers of Regular Black Tone.—Dr. G. Hauberrisser, as the result of experiments made to find a means of preventing a gaslight developer from giving prints of imperfect colour after

use for one or two sheets of paper, has found that the addition of a few drops of tribasic sodium phosphate solution is an effective aid. Using edinol single solution developer and "Tula" or other gaslight paper, a few drops of 10 per cent. tribasic sodium phosphate solution after each print had been developed was found to keep the developer in proper condition to give a good black tone, the time of development remaining practically the same. The time which a print takes to come up may be taken as an indication whether the developer does or does not require a little of the phosphate solution.—Eder's "Jahrbuch," 1908; "B.J.," Nov. 20, 1908, p. 887.

Control in Developing Gaslight Prints.—T. H. Greenall secures considerable latitude in exposure by adopting a tentative method of development, placing the prints first in a highly restrained developer of hydroquinone and pyrocatechin, and after a short immersion transferring to a solution of eikonogen and sulphite without alkali. It was found that by this method four prints from the same negative made on "Rotox" paper with exposures 20, 40, 60, and 90 seconds were practically alike as regards gradation and density, and very little different in colour.

As the prints are exposed they are placed in the following solution at normal temperature (60 degs. to 65 degs. F.):—

Pyrocatechin	2 grs.	0.13 gm.
Hydroquinone	2 grs.	0.13 gm.
Sulphite of soda	20 grs.	1.3 gm.
Citric acid	2 grs.	0.13 gm.
Potass. bromide	1 gr.	0.065 gm.
Potass. carbonate	20 grs.	1.3 gm.
Water	6 ozs.	170 c.c.s.

It is well to dilute this further and place the prints upright in the diluted developer in a tank. After 2 or 3 minutes in the concentrated, or 10 or 15 minutes in the tank, developer, examine the prints as regards their lighter tones. A print which already looks pinky all over must be left to finish out in the restrained developer, as it has had long exposure, and will give a warm-coloured print of good gradation if left until it appears very strong and rich before fixing. But the majority of the prints should show either nothing at all, or a pinky deposit in the shadows only, after the above time in the restrained developer, and these are to be taken out singly as the shadow detail appears, rinsed under the tap back and front for a few seconds, and finished in the eikonogen solution. This contains no alkali, and it will bring up the high-lights even when the exposure has been one-fifth or one-tenth of the three minutes required for a sepia print; at the same time, it will not block up the shadows:—

Eikonogen	100 grs.	11.4 gms.
Sulphite of soda	600 grs.	68.4 gms.
Water	20 ozs.	1000 c.c.s.

This solution may be used repeatedly, provided the prints are always rinsed as they are transferred to it. As to the proper

moment to make the transfer, the general rule is to leave the prints to gain some shadow detail in the restrained developer, and use the eikonogen for finishing off, but a print from a contrasty negative should be changed earlier than one from a flat negative, which should be left a longer time in the restrained developer to gain increased contrast

The eikonogen alone would give an extremely soft and thin result, whilst the restrained developer alone would give either nothing, or "soot and whitewash," except in the case of those long exposures already referred to Fixing is in the usual acid fixing bath, and it is well to bear in mind that blacks and cool sepias do not lose as much in fixing as do the warm sepias before mentioned.

Finally, should it be desired to have "red chalk" prints, it is only necessary to give long exposure and use the restrained developer with a little extra bromide —"Photo-Notes," Feb, 1909, p 30, "B J," Feb 19, 1909, p 139

P O P Tones on Gaslight —Harold Baker mentions that a gaslight print if left in the acid fixing bath for from twelve to fourteen hours will assume a tone resembling that of a gold-toned P O P —"Phot Scraps," Oct, 1909, "B J," Oct 8, 1909, p 785

Toning Bromide and Gaslight Prints.

SULPHIDE TONING

Dry Sulphide Toning —It is suggested that the use of bromine vapour might be used as a method of toning dry prints, its bleaching action being followed by the application of sulphuretted hydrogen gas This pair of substances in solution provides an excellent toning process, no washing between bleaching and darkening being necessary The process, either wet or dry, might be made workable in conjunction with a rotary developing and fixing plant —"B J," Feb 5, 1909, p 98

Scum on Sulphide-toned Prints —In some notes on the theory of sulphide toning it is mentioned that the sheen or scum on a sulphide-toned print can be partially removed from the dry print with hard indiarubber, or from the wet print by rubbing with cotton wool after the bleaching bath has been applied A remedy, therefore, is to re-bleach the print, rub with cotton wool and to re-develop —"B J," Jan 29, 1909, p 79

The Developer and Sulphide Tones —Harold Baker advises the use of more hydroquinone than metol in the developer of this formula when warm sepia colours are required from an average negative, using also a liberal quantity of bromide, and rather less sodium carbonate solution than usual If cool sepias are wanted, equal parts of metol and hydroquinone are taken, and potassium carbonate used as the alkali, the exposure being about half the time for warm sepia —"Phot Scraps," Oct., 1909, "B J," Oct 8, 1909, p 784.

Factors in Sulphide Toning.—Douglas Carnegie, in the course of an important paper on the practice of sulphide toning, arrives at the following results —

Colourless commercial crystals of soda sulphide were found to contain 97 6 of the real sulphide cryst (Na_2S $9H_2O$) In practice a solution should be used not much weaker than 1% of real (anhydrous) sulphide, i e, one made as follows -

Soda sulphide, commercial white cryst	300 grs	33 gms
Water	20 ozs	1000 ccs

Though the decomposition of solutions of this strength is very slow when they are kept well corked and in darkness, yet if absolute constancy of tone is essential it is necessary to use freshly made solution The bleaching solution should not contain an excessive quantity of bromide, otherwise the bleached image is liable to be dissolved and to lose fine details A suitable formula is

Potass ferricyanide	300 grs	34 8 gms
Ammonium bromide	95 grs	10 8 gms
Water	20 ozs	1000 ccs

This may be used over and over again to complete exhaustion, so long as it is kept in a stoppered bottle in the dark.

No evidence could be discovered in support of the statement sometimes made that the bleaching solution after frequent use is found to contain potass cyanide

When sulphide solution much weaker than the true 1% is used, the wash after bleaching should be of short duration Long washing, especially when using weak sulphide solution, leads to poor tones Good warm tones are obtained simply by rinsing the print after bleaching and then passing on to the sulphide bath, but when this is done the sulphide bath must be thrown away at once Generally the evil effect of long washing is most marked in the case of solutions of ½% strength (real sulphide) but in no case is a short wash injurious

As sulphide deteriorates in solution (hypo being formed), the tones of prints pass through successive phases of degradation as follows —

(1) The bistre phase—the toned image becoming progressively colder and rawer

(2) The ochreous phase—the image getting progressively lighter and often showing metallic glance in the shadows

(3) The phase of incipient solution of the bleached image with re-precipitation in the sulphuretting solution, a faint yellow image remaining in the gelatine

(4) The phase of complete solution of the bleached image, leaving only the residual image of development in the gelatine

The change in the sulphide solution which produces these results is due more to the action of air than to that of light upon the sul

phide bath It is much more rapid with solution of ½% than with those of 1% of real sulphide

It was found that the alteration in the solution giving the excessive tones 1 to 4 is dependent on the proportion of sulphide to hypo in the sulphide bath, and that this ratio varies for every different strength of sulphide bath Thus, the ratio hypo sulphide which must be reached to bring on phase (1) is about 8 5 for 1 5% sulphide, but only 2 5 for 1% sulphide Again, the ratio for phase (3) was 8 1 in the case of a 1% sulphide solution, and only 4 1 for a solution of 05% concentration

The polysulphides of sodium (made by boiling sodium sulphide solution with sulphur) give colder tones than the mono-sulphide, and the solutions deteriorate very rapidly Yellow "sulphide of ammonium" so called, also gives colder tones than sulphide of sodium

There seems to be no satisfactory method of bettering a sulphide toning failure by any process of re-bleaching and re-sulphuretting The only procedure with a failure is ruthlessly to scrap it, and begin *de novo* using a freshly made sulphide solution

For bringing out blocked up detail in the heavy shadows of toned prints there is no better specific than "Lustralene" It is advisable to heat the print before a gas fire after waxing it —"B J," Aug 27, 1909, p 664

Ferricyanide and Mercury in Sulphide Toning —H W Bennett, in a paper before the Royal Photographic Society, has given the formulæ used by him in obtaining a range of tones from warm-black to brown by employing as a bleaching solution a mixture compounded from two stock solutions, one containing (in every 10 minims) 1 gr of potass ferricyanide and 1¼ grs of potass bromide, the other containing (in every 40 minims) 1 gr of mercuric chloride and 1 gr of potass bromide These are employed in various proportions much on the lines laid down in the table by the same worker in "B J A," 1909, p 604 The working solution should contain 4 grs of ferricyanide per oz, and there might be the same quantity of mercury chloride —"Phot Journ," June, 1909, p 280

Improving Sulphide-toned Enlargements —W J Routley, for the improvement of large sulphide-toned prints of weak or yellowish colour and large enough to make the trouble worth while, suggests the following process by which the sepia is intensified or the original black or grey brought back Four solutions are required — A, the ordinary mercury solution used in intensification, B, re-developer made by diluting any bromide paper developer with from four to ten times its bulk of water, C, the ordinary bleacher of ferricyanide and bromide, and D, the ordinary sulphide solution

The A solution acts in from 30 seconds to a minute on the print, partially bleaching it The print is then given a wash of at least ten minutes, and, for a black tone, re-developed in B of the weakest strength—i e, diluted ten times If developed until just a trace of warmth is left a fine black print, without warmth, will be obtained on drying

If a second sulphide-toning is to be done, use B four times diluted only and re-develop fully. Print will be seen to be considerably intensified, and is then put through the ordinary sulphide toning process If necessary the print can be again bleached in the mercury and once more re-developed and toned The results have shown no signs of change within the three months elapsed since producing them —"Phot," Dec 29, 1908, p 689

Re-toning Sulphide-Toned Bromides—It is well to use a strong bleacher (potass bichromate, 10 grs, hydrochloric acid, 20 minims; water, 1 oz) when rebleaching prints which have failed to darken or to give a good tone in the sulphide bath And it is well to allow bleacher to act for from fifteen to thirty minutes to make sure of complete action A 1 5 rodinal developer applied to the washed print will usually give a strong image, if not, a short exposure of the print to strong light should be tried, and if this fails to yield sufficient density in five minutes let the print soak in the developer for another ten minutes, then wash and transfer it to an ordinary strong bromide paper developer, such as amidol or metol-hydroquinone If none of the image has been destroyed by the hypo in the sulphide solution, we shall, by these means, produce a good strong result, which may be black if the re-development has been rapid, or a fine rich brown if the development was slow If desired, we can then re-tone, using quite fresh solutions, but, as a rule, the brown tone arrived at in the process of re-development is a far finer colour than any possible by sulphiding methods, and it may be well left alone —"Photo-Notes," Mar, 1909, p 45, "B J.," Mar 12, 1909, p 198

THIOMOLYBDATE TONING

Thiomolybdate Toning—The patent specification of Harry E Smith gives the directions, which appeared in the "Almanac" for 1909, p 606 Eng Pat No 22,218, 1907—"B J," Nov 6, 1908, p 853

For thiomolybdate toning of print-out papers, see under "Toning P O P"

OTHER TONING METHODS

Sepia Tones by Re-development—C Welborne Piper has worked out a method of obtaining warm tones by bleaching the print and re developing in full light with a highly restrained developer as used in the ordinary way for obtaining warm tones usually on lantern slides The advantage of this process over that in which a restrained developer is used in the first instance is the greater certainty of working and the much better regularity of tone which can be secured in a series of prints The tones are better than those by the sulphide method A suitable bleaching solution consists of 10 grs of bichromate of potash and 5 minims of hydrochloric acid per ounce of water The bleached prints are well washed and immersed in the following developer, which is used in a good light (daylight) —

A.—Hydroquinone	160 grs	36·5 gms.
Potass metabisulphite	90 grs	20 5 gms
Potass bromide .	20 grs	4 6 gms
Water	10 ozs	1000 c.c s.
B —Ammonium carbonate	1 oz	100 gms
Water	10 ozs	1000 c c s

A mixture of equal parts of these two solutions forms a very useful developer

With two parts A, one part B, and one part water development is slower, and we can stop at a light red-brown tone With two parts A and three parts B development is quicker, and a deep brown is quickly reached

Very good warm browns are produced when potass ferricyanide is the bleacher, while with the ferricyanide and bromide bleacher purplish browns are more readily obtained When copper chloride is the bleacher black tones only are produced —"B J," Mar 25, 1909, p 231

Some further notes on the method recommending an ordinary hydroquinone developer modified by using for the alkali or No. 2 solution a mixture of ammonium bromide 1 oz, strong ammonia 1 oz, in water 10 ozs, are given by Mr Piper Equal parts of the two solutions are mixed and the mixture diluted with an equal bulk of water This re-developer gives a rich brown tone —"Photo-Notes," Apr, 1909, p 67

Red, Green, and Blue Tones —C W Somerville recommends for a red tone the use of an alkaline solution of copper ferricyanide in preference to the Ferguson formula in which potassium citrate is used as a means of preparing a clear workable solution of copper ferricyanide A suitable formula is —

Ammonium carbonate (saturated solution) . .	1 oz	30 c c s
Copper sulphate	10 grs.	0 65 gm
Potassium ferricyanide	25 grs	1 6 gm.

Owing to the alkaline condition of the ferricyanide this formula works more rapidly (For the sake of historical accuracy it should be mentioned that an alkaline solution of copper ferricyanide made by dissolving first copper sulphate and then potassium ferricyanide in saturated solution of ammonium carbonate preceded the Ferguson method The first working directions are probably those in the "Photogram," 1896, p 90 —Ed "B J A")

For green tones a solution of vanadium chloride and potassium ferricyanide containing also a ferric salt is the most satisfactory process The formula is —

Ferric chloride	1 gr.	0 065 gm
Oxalic acid (saturated solution)	60 ms	3½ c c s
Vanadium chloride (pure)	2 grs	0 13 gm.
Nitric acid	5 ms.	0 3 c c.
Water to make	½ oz.	14 c c s.

Then add, stirring the while—

Potassium ferricyanide ...	1 gr	0 065 gm
Water to make	½ oz	14 c c s

Tone from one to two minutes, the longer the immersion the lighter the green Wash ten minutes and immerse in hypo bath given for blue tones Wash five minutes

For blue tones the mixture of ferricyanide and a ferric salt should contain also potassium oxalate, which tends to prevent precipitation The formula is —

Ammonia alum (10 per cent solution)	50 ms	2 8 c c s
Potass ferricyanide (10 per cent solution) .	10 ms	0 6 c c s
Potass oxalate	30 grs	1 9 gm
Ammonia iron alum	12½ grs	0 8 gm
Hydrochloric acid	2½ grs	0 16 gm
Water	1 oz	28 c c s

The toning action is continued until the desired shade is obtained and the print then washed free from stain It is then placed in a hypo bath of—

Hypo	4 ozs	250 gms
Boric acid	400 grs	45 gms
Water ..	20 ozs	1000 c c s

and finally washed for five minutes—"A P," Feb 2, 1909, p 101

Two-Colour Effects with Bromide Paper—Dr D'Arcy Power, in discussing methods by which to obtain with bromide paper two colour effects such as those produced by multiple-gum or gum and platinum, gives the preference to the two following methods —(1) Toning the whole print to sepia with mercury and platinum-chloride, and then producing local toning (to a rich black) with amidol developer applied with a brush, (2) local bleaching as for the sulphide process, washing, and conversion of the partially bleached print into an ozobrome by the non-transfer or No 1 method Owing to the absence of metallic silver in unbleached portions no pigmented gelatine is thrown down at these points The ozobrome is washed and dried, and the bleached area re-developed with a brush charged with amidol developer, again washed and brought into contact with a piece of ozobrome tissue of the desired second tint Development is carried out as before, a second deposit of pigmented gelatine occurring solely over the re-developed area, and thus giving a print in any two of the colours in which the ozobrome tissues are obtainable —"Photo-Era," May, 1909, p 221

The Carbon Process.

Charbon-Velours—H Schneeberger gives directions for the making of a paper which he called "charbon-velours" of properties evidently similar to the "Artigue" paper much used in the pre-gum era of English pictorial photography A stiff paste of starch is rubbed up with the necessary quantity of pigment This latter may

be the various powder water-colours or the moist colours, so long as these latter contain no tanning substances, for which reason it is better to keep to the powder colours Compared with other pigment papers, a very large proportion of pigment is used, the mixture being applied in a thin coating, but yet representing an application of pigment which completely covers the white paper If applied too thickly the result is that of carbon worked without transfer; that is to say, the half-tones and those parts where the light has not penetrated to the support wash away With too thin a coating the characteristic velvety appearance is not obtained The coated paper may be stored for any length of time It is sensitised in the ordinary bichromate bath of from 2 to 5 per cent strength, the weaker for flat and the stronger for hard negatives Development is done with a broth of sawdust, about 120 gms per litre of water, which is poured over and over the print at about 80° F—"Phot Kunst," Nov. (Heft II), 1908, p 285

Direct Carbon Copies from Drawings—See "Contact Copies of Plans, etc," under 'Copying'

The Ozobrome Process.

Border Prints with Ozobrome—The Rev T A Cooper uses ozobrome in conjunction with print-out paper as a means of producing an artistic two-colour border effect for prints or postcards One or more borders are printed round a white space (obtained by a mask) on ordinary or self-toning P O P of matt or rough surface A good bromide or gaslight print is then made from the negative to be inserted in the space, and trimmed exactly to size A piece of ozobrome plaster is then cut ⅛ in larger than the picture, and the bordered postcard, previously soaked in warm water, is used as the final support of the ozobrome picture made in the ordinary way Care should be taken to mark on the back of the plaster which is the top of the picture, and that the plaster exactly fits in its place, this is easy because the size of the picture shows through the back of the plaster as well as plaster itself, exactly fitting the first printed border Should the margin of the tissue be noticeable on the dark line of the border or have spread beyond by any carelessness, it may easily be removed with a sharp knife before the carbon is dry The result is a superior looking pictorial postcard which has the appearance of being printed in two colours, if the tints of the silver printed border and the colour of the carbon are well chosen—"Phot Monthly," Jan, 1909, p 12

Ozobromes in Colour—W Ermen describes the procedure used in obtaining multi colour effects by the ozobrome method—Let us suppose that we have an open landscape, in which there is a blue sky with white clouds, green hills, water, ships and beach Make a good bromide print of this, and after washing thoroughly, rinse in dilute formaldehyde, and allow to dry The sand, and any other portion of the picture which is wanted yellow, is carefully washed over with a brush just moistened in ozobrome stock solution until

bleached, and the print then flooded with water, so that the excess of solution is washed off without damaging the rest of the print The whole print is next treated with marine blue ozobrome tissue, which gives us the landscape all in blue, except the sand, which is left bare of pigment The print must now be dried again, to enable the newly deposited gelatine to stand the next processes When quite dry, take a fine camel-hair pencil just moistened with a strong developer, and go over all the portions of the print that are required black, such as the hulls of ships or rocks With a weaker developer clouds may also have their shadows slightly emphasised

For the production of greens we proceed in the same manner, only using sodium sulphide solution of the ordinary toning strength The yellowish tone of this combines with the blue pigment deposited to give just the dull green required for grass The tone of green can be modified at will by varying the amount of sulphide applied, and can be shaded off to the blue of the distance without any difficulty

Finally, the yellow sand is got by painting the portions of the print which were bleached before pigmenting

The finished print is finally fixed in hypo after a slight washing to remove the last traces of developer and sulphide

The introduction of other colours into the print offers no difficulty. Suppose that in the print which we have already discussed, we wish to bring out a red sandstone wall running over the hill Those portions of the print reserved for red are protected by a preliminary bleaching The print is then manipulated as before, but instead of fixing after sulphiding, the reserved portion is re developed instead of the rocks and the ships The print is then washed and rinsed in formaldehyde, and dried to harden the pigment layer The ozobrome manipulation inserts red pigment on all the developed portions A slight reddish tint may show on other light portions of the paper, but this can be scrubbed off without fear of disturbing the underlying blue pigment, which not even boiling water will remove Further layers of colour can be put on to any part of the unsulphided portions by redeveloping as before, after drying with formaldehyde The last stage is always the blackening with developer where required, followed by fixing

One word of warning If the sky is reserved by bleaching, with the object of putting on the blue layer last of all, the pigment tissue must not be allowed to remain too long in contact with the print, or else the sky will come out much too dark. Probably this is due to the insolubilising action of developer left in the paper, which is subsequently oxidised by the ozobrome solution —"A P," June 15, 1909, p 571.

Casein-Pigment Prints from Bromide or other Silver Prints — The Neue Photographische Gesellschaft has patented the method of preparing pigment prints from those on silver bromide, or other silver paper, by brushing over the finished silver print a mixture of casein and pigment. The coating is allowed to dry, and the coated print then placed in a solution containing potass ferricyanide, potass bichromate, and potass bromide In this solution an image in

insoluble casein containing pigment is formed, just as one of gelatine is produced in the ozobrome process by application of a pigment tissue, soaked in a similar solution, to a bromide print.

The casein may be employed either in the so-called "curd" or in acid or alkaline solution. One formula is as follows :—250 gms. of pressed-out curds are ground with 50 to 60 gms. of water-colour. This mixture is brushed over the bromide print, allowed to dry, and print then placed for 10 to 15 minutes in:—

Potass bichromate	10 gms.	88 grs.
Potass ferricyanide	10 gms.	88 grs.
Potass bromide	10 gms.	88 grs.
Water	1000 c.c.s.	20 ozs.

The picture then "developed" in water at from 105° to 125° F., to which a little potass oxalate or sodium bicarbonate may be added to secure clearer lights.

A variation of the process is to first bleach the bromide or other silver print in 5 to 10 per cent. potass ferricyanide, to then apply the mixture of pigment and casein, to dry, and then to immerse in a solution of bichromate and bromide, afterwards developing in warm water and fixing in hypo.—Eng. Pat. No. 19,297, 1908. "B.J.," June 18, 1909, p. 480.

Ozobrome for Enlarged Negatives.—See under "Reproducing Negatives."

Gum-Bichromate.

Arabin Process.—Nelson K. Cherrill has devised a modification of the gum process, using in place of gum the arabin or gummic acid obtained by precipitation from gum solutions with acid and spirit. He also employs pigment perfectly freed from grease, the need for this freedom and the use of the gummic acid being based on the theory that in the development of the gum print the parts rendered insoluble by light form a membrane through which the unaffected parts pass. To prepare the arabin, 150 c.c.s. of 5 per cent. hydrochloric acid are placed in a litre jar and 100 gms. finely powdered and sieved Soudanese gum (14d. lb.) poured in with vigorous stirring. Mixture may be warmed to 122 degrees F., but must not be made hot. Solution is complete in half-an-hour with frequent stirring, and mixture is then left to cool. 600 c.c.s. of best methylated spirit, free from mineral naphtha, is now added, and mixture well stirred at intervals for half-an hour; the gummic acid (arabin) is precipitated as a white mass, which, as the water is removed from it by the spirit, ceases to have any stickiness. The whole contents of the jar are then poured out on to a muslin or cheese cloth, laid on top of a funnel so as to drain and squeeze off all possible liquid. The arabin is now placed in a second jar and covered with spirit to a depth of an inch or so, breaking the mass up well with a stick of wood. It is then left to itself for several hours, and the liquid again drained and squeezed off in clean cheese cloth. The arabin should now have a gritty feeling. The

final traces of liquid are removed in a screw-press, the arabin being wrapped in a towel It is then put to dry at a gentle heat and broken up in a mortar A neutral solution of the arabin is made as follows.—

Arabin	20 gms.
Magnesium carbonate, heavy	2 gms
Water .	40-75 c.c.s (See later).

This will be very frothy for several hours, stir until froth subsides, and filter through a muslin bag The filtrate is the liquid to be mixed with the pigment and bichromate in making the sensitising liquid

To prepare a pigment black perfectly free from grease the best plan is to burn camphor in a closed vessel, to collect the "soot" produced, and to wash it five or six times with a mixture of ether and acetone in a test tube, it being finally dried by dipping the lower end of the test tube in hot water A suitable black, corresponding to the above, is made by Newman and Co, 24, Soho Square, W C, as "Lamp-black No 4"

In deciding on the proportion of pigment to gum solution, regard must be paid to the fact that a certain quantity of gum is needed to allow of the pigment being completely removed from the paper in a short time, or, say, in the time which the print itself takes to develop Adopting thirty-five minutes at 95 degrees F as a normal time for development, the most satisfactory method of coating papers (which vary in their powers of fixing the pigment) is by using arabin solutions containing 20 parts in 45 to 75 parts respectively of water Lamp-black is added to each of these in the proportion of 0 4 to 0 5 gm per 10 c c s, and the two mixtures mixed in various proportions to give a perfect result Just before use the mixture is sensitised by addition of an equal volume of 15 per cent ammonium bichromate (dissolved hot), neutralised by addition of precipitated chalk

The paper is thinly coated, and is printed and developed in the usual way It gives "straight" prints of full gradation, whilst it allows of any degree of control —"Phot Monthly," June, 1909, p 129.

Preparing Gum Paper—T C Hardy recommends that raw paper, as used by makers of bromide papers, should be used, a brand being selected by examination with a lens, and that having the most irregular surface selected The paper is sized with a mixture of alum and gelatine, made as follows —

Water	10 ozs	200 c c s.
Gelatine	½ oz	10 gms
Potash alum . .	10 grs	0 45 gm.

The gelatine should be dissolved in nine-tenths of the water, the alum in the remainder, and the latter added slowly to the gelatine solution with constant stirring

Two applications of this are given, the paper being allowed to dry after each It is then a good plan to immerse the paper in a

2 per cent. solution of commercial formaline (again drying) before applying the sensitiser, which is a 15 per cent solution of ammonium bichromate, and is applied with a brush previously wetted This pigment mixture consists of one part of gum arabic dissolved in the cold in two parts of distilled water and containing water-colour to give the intensity desired —" A P ," May 4, 1909, p 420

Powder Sensitisers in Gum Printing—Société Anonyme la Photographie des Couleurs, J Sury and E Bastyns, have patented a dry mixture such as one of gum arabic, 20 parts, sugar, 1 part; potass bichromate, 4 parts, together with pigment, 20 parts, for use as a sensitising mixture for the gum bichromate printing process A mixture, such as the above, is dissolved in twice its weight of water to form a sensitising liquid, which is applied to paper, and the latter exposed under the negative and developed in water just as in the gum process The mixture is intended to be used in making three-colour prints by successive sensitising of the same piece of paper —Eng Pat No 27,686, 1908, "B J," Aug 20, 1909, p 654

Gum-Platinum Printing—Malcolm Arbuthnot, in reviving the use of the gum process applied to a paper on which a platinum image has already been made does so on the ground of thus securing the fine rendering of half tones of the platinotype process and the shadow depth of gum Registration being necessary, it is convenient to use a drawing board instead of a printing frame, as suggested by the late Horsley Hinton, attaching a piece of stout flannel to the board, laying upon this the platinum paper, coated side up and half an inch larger than the negative, the paper being pinned to the board at the four corners Stout pins are then driven through the paper into the board so that they press firmly against the sides of the negative laid centrally upon the printing paper The platinum print having thus been made—the negative is lifted off to watch the progress of printing—it is coated with the gum sensitiser and placed again on the flannel-covered board, passing the pins into the same holes in paper and board The coating with the gum mixture, printing and development are done in the ordinary way If it is found that the gum print has been over-exposed, it is soaked for two or three hours in 5 per cent alum solution —" A P ," Mar 2, 1909, p 197

The Oil Process.

Oil and Bromoil at One Operation—Ernest Marriage describes the method of obtaining from one bromide print a (reversed) oil print for pigmenting, and also a bromoil to be treated in the same way The bromide print is best of smooth but not glossy surface, such as the "Rotograph" half matt The transfer paper is best that of the smooth variety used as the final support in the double transfer carbon process The transfer paper is soaked in ozobrome

solution, mixed with four times its volume of water, the bromide print meanwhile soaking in plain water. As soon as the transfer paper is limp it is placed for ten seconds in the following solution:—

Hydrochloric acid	1 drachm	3.5 c.c.s.
Common salt	550 grs.	35 gms.
Water	25 ozs.	700 c.c.s.

It is drained for half a minute from one corner, placed in contact with the bromide print under water, and the two then squeegeed together as in the ozobrome process. It is important that the transfer paper be larger than the bromide print. The transfer paper and the print now in contact should be left to dry a little (say, two or three minutes), the print uppermost. All that is wanted is to ensure that the margin of the transfer paper which is uncovered is dry enough to resist the solution in the next operation. The transfer paper does not soak up as much of the ozobrome solution as carbon tissue will, not enough, in fact, to bleach the silver image, and in order to get the maximum hardening effect the silver must be entirely converted. The transfer paper, still squeegeed to the print and the print uppermost, is now floated upon the ozobrome solution. In this way all the active solution must go through the transfer paper to reach the silver image, and is more likely to take effect than if part of the bleaching is done through the back of the bromide print. The time required is about fifty minutes, but this would vary, no doubt, with temperature and different types of paper. It is easy to see when the bleaching process has been thoroughly carried out by holding the papers against a strong light; a faint image will be still visible, but all black should have disappeared. If this is not the case, the prints should be again floated on the ozobrome solution. The print should be held by opposite corners and lowered gradually on to the surface of the liquid, beginning at the middle; in this way the paper can be floated without getting any of the solution on to the bromide print lying uppermost.

When the bleaching of the silver image has been thoroughly effected, the print is separated from the transfer paper by pulling from one corner, and both print and transfer are placed for about a minute in the acid bath. After washing until both papers are free from stain, the transfer paper is dried. The bromide print is fixed in a bath of plain hypo, if it is to be treated as a bromoil, and dried after washing, or it may be redeveloped, dried, and used again for making further transfers. The dried prints, whether bleached bromides or transfers, are soaked for an hour in water at about 65 deg., then blotted off and inked up on a wet pad in the usual way. A stiff lithographic ink, thinned down with pale drying oil is used. The transfer print or ozo-oil may require just a touch more oil with the pigment than the bromoil.—"Photo-Notes," July, 1909, p. 125.

Oil-Ozobrome.—The method of preparing an oil print by a transfer process from a bromide is the subject of a booklet issued by Messrs. Ozobrome, Limited, who supply the necessary transfer paper. This latter is placed in the bleaching bath given under "Bromoil," laid

on a glass slab, and the bromide print (soaked in salt solution) squeegeed in contact with it The salt solution is.—

Common salt . .	1 oz	50 gms
Water	20 ozs.	1000 c c s

Transfer paper and bromide print are kept in contact for from 5 to 15 minutes The progress of bleaching can be seen by holding the two papers up before a fairly strong light When it is seen that the image is completely bleached the two papers are separated under water, washed for a few minutes, and the transfer paper then prepared for inking by allowing it to become perfectly dry and then re-soaking in water for 5 or 10 minutes —"B J," Sept 10, 1909, p 707

Finishing-off Oil Prints—Professor A Albert recommends that the wet prints should be laid face up on a glass plate and secured to the latter by four strips of gummed paper, being then put aside to dry spontaneously, which they do within twelve or twenty-four hours The surface is then freely dusted over with French chalk (talc), the excess removed with a soft brush or tuft of cotton-wool, and the print then flowed over or painted with a solution of shellac in alcohol until there is no further repulsion of the shellac by the strong portions of the print The veiling of the pigment by the French chalk is removed by this varnishing, and the varnish dries very quickly, the film being so thin that there is scarcely any effect upon the matt surface of the print When the shellac coating is dry the surface may be given a thin coat of a very fine grain matt varnish When this is dry, the print is removed from the glass and mounted In this latter operation the print is first laid for about twenty minutes between wetted sheets of paper (filter paper), a good paste then applied to the back, and the print pressed into adhesion. —"Phot Korr," Feb, 1909, p 86

The Bromoil Process.

(Oil Prints from Bromides)

A formula for the bleaching of the bromide print to be converted into a bromoil is given as follows by A H Garner —

Potass ferricyanide	2 grs	2 3 gms
Potass bromide	9 grs	10 3 gms
Potass bichromate	9 grs	10 3 gms
Ammonia alum	18 grs	20 5 gms
Hydrochloric acid (10 per cent solution)	20 drops	30 c c s
Water	2 ozs	1000 c c s

This is used at a temperature of 80° F (not lower) from two to four minutes If the alum and hydrochloric acid be omitted the resulting image will take the ink but very sparingly If alum be now added bleaching in the deepest shadows goes on very slowly, while the capacity of the image for taking ink is greatly increased Addition of a little 10 per cent hydrochloric acid solution quickens

bleaching and raises the key of the whole print—that is, keeps the whites pure and tends to prevent reversal. Five drops of the acid solution per ounce is sufficient for a soft gelatine paper, or 20 drops per ounce for the hardest. Addition of acid thus will correct a paper which takes ink too readily, and, further, a soft, delicate print is best bleached with a minimum of acid, a strong overdone one, with a maximum.

At a lower temperature than 80°, say 60° to 65° F., the bleaching action takes place, but the bromoiling effect is greatly inferior.—"Phot.," Jan. 12, 1909, p. 34.

Messrs. Ozobrome, Limited, proprietors of the patent of T. Manly, No. 17,007, 1905, have, through the Press, notified makers and users of such solutions that they render themselves liable to prosecution for infringement of the above patent.

Hints on Working Bromoil.—Harold Baker prefers to use the "carbon-surface" Ilford bromide paper, developed to a somewhat soft print, with full detail in the high-lights and not too heavy shadows. It is found best to bleach as soon as freed from hypo, to dry the bleached print and re-moisten just before pigmenting. When it is necessary to prepare a dried, bleached print for inking it should be soaked for five minutes in water, and when quite limp be placed in a 5 per cent. solution of sulphuric acid for one minute and washed for a few minutes. Full and even treatment in the sulphuric acid bath is a very essential point. When starting to pigment, the print will take the ink all over, and the pale yellow image will disappear, but if the gentle dabbing is continued it will be seen that the colour is taken from the lighter parts and piled up on the darker places, and the longer the action goes on the finer the grain of the deposited ink becomes, while fine detail is secured at the same time. It is best to ink the whole surface of the print in this way, except when there is a sky in the subject, which is best left until the last.

As regards the modes of using the brush, gentle dabbing with a slight smudging produces a smooth surface but slightly obliterates detail; this is sometimes of great value when some parts need to be made less obtrusive. A gentle dabbing with smudging gives a fine grain with plenty of detail, while a hopping action, allowing the brush to fall from the height of an inch, lightens the lighter parts, strengthens the darks, and also brings out detail. If the brush is fixed in a piece of tinned wire, so that the handle of the brush forms a right angle with the wire, this hopping can be done much better and more quickly. But hopping should be used as little as possible; the best prints are those that have been hopped least.

The finished print should be kept in a place free from dust for a day or two, if convenient, for a week, so that the ink may become thoroughly hard and dry. The whites or lightest tones of the print will improve on drying, and the parts which when wet appeared as blank white spaces, devoid of detail, will show much less white and with a good indication of form.

As soon as the ink has ceased to be "tacky" it may be protected by varnishing. The best of all is celluloid varnish Used slightly thinner than that usually sold, it can be poured over the unmounted print pinned to a board or piece of card, just as if it were a negative In an hour or two the varnish will be quite dry, and the print will now bear a considerable amount of handling, and may be mounted either with any of the various pastes sold for the purpose, or, better still, by the dry-mounting process —"Phot Scraps," Mar., 1909, p 19

Harold Baker gives the following further hints —If greater contrast is required in the print, more citric acid may be used in the bromoil solution

When judging of the proper action of the acid bath, blow a piece

Fig 1 -Inking.

of the print surface-dry where a high-light comes against a shadow; the former should be seen to be standing slightly above the shadow

When drying the fixed and washed print, blot off all drops of water, if left on the print they prolong drying and cause patches which may afterwards refuse to take the ink

It is best to dry before pigmenting, prints pigmented right away will behave as well under the brush as those that are dried on first inking up, but are apt to show loss of detail and lighter tones On the other hand, the original bromide is best not dried before bleaching

The photograph shows the position of the brush when inking in the ordinary way, the elbow being rested on the table The bristles

at the toe of the brush press on the paper first and bend and spread a little before the heel of the brush comes down One soon finds that quick, smart touches produce contrast and detail, very gentle smudging dabs give softness, reduce the sharpness of detail, or even obliterate it

When "hopping," which should be used as little as possible, a flat-ended brush is used, the movement being to allow the brush to fall from the height of an inch or more, or, as shown in the photograph, fixing it on a wire and giving a series of taps "Hopping" gives lightening of the light tones and a strengthening of the dark.

Fig 2—"Hopping"

In commencing to use a brush just recharged with ink, apply it to a dark part of the subject, using it for lighter portions when the ink in the brush has been reduced, parts which are to be very delicate may be treated with a clean brush, picking up enough ink from surrounding darker parts

A reasonable time for pigmenting an 8½ × 6½ bromoil is half an hour, though one may spend as long again over the sky

Dust and hairs being a great trouble in the ink, it is a good plan to take out from the ink tin (which should have a closely fitting lid) enough for one print, cleaning the brushes with petrol before commencing the next print.

A very smooth brush may be made by dipping a brush which has been cut level in hot glue, allowing it to become quite hard by keeping for a day or so and then grinding the end smooth on a fine stone, finally dissolving out the glue with hot water

Very suitable inks are those of Frank Horsell and Co, Leeds, being those of good quality for half-tone printing The "Congo black" may be mixed with some burnt umber to give a fine sepia; or raw sienna, sometimes with a small addition of blue, will produce a good greenish-brown, which on ivory (cream) paper gives a suggestion of old parchment. These few varieties of ink are amply sufficient

The easily damaged surface of the bromoil may be safely protected by celluloid varnish as used for negatives. This allows of prints being dry-mounted, a shellac varnish being inadmissible for this method of mounting The varnish must on no account be put on with a brush, the best plan is to pour it on as in varnishing negatives If a pool be poured into the middle of the print and the bottle set down, both hands may be used to flow the varnish over the whole surface, draining it off from one corner and hanging up to dry by the opposite corner.

For spotting bromoils use water colours mixed with ox-gall to make them take to the greasy surface —"B J," Apr 9, p 279, and Apr 16, 1909, p 302

Simplified Formula —C H Hewitt dispenses with the acid bath in the Welborne Piper formula (see under "Standard Formulæ") In place of it he uses a solution of ammonium sulphocyanide 1 oz in 20 ozs of water, which works well with Barnet "smooth-ordinary" bromide paper Further, the sulphocyanide bath acts also as a fixing bath, the bleached print being simply washed in a dozen changes of water, placed in the sulphocyanide bath and again washed, when it is ready for pigmenting —"A P," Mar 30, 1909, p 299.

J M Sellors works the process as follows —Exposing the bromide paper as usual, it is soaked for a few seconds in plain water, developed with amidol, rinsed for one minute under a spray, and placed at once (unfixed) in the bromoil bleacher heated to 80 to 90 deg F After bleaching (which lasts from two to three minutes) there is another rinse under the spray for one minute, after which the 5 per cent sulphuric acid bath is used for from three to ten minutes After a further one-minute rinse, print is fixed for five minutes in an acid bath, is washed for ten minutes, and is then ready for pigmenting Process occupies about half an hour in comparison with the 45 minutes necessary according to the usual method

The amidol developer is —

Amidol . .	9 grs	0 6 gm
Sodium sulphite, neutral solution (Piper formula) .	300 mns	18 c c s
Water, boiled to make	4 ozs	113 c c s

This is used repeatedly, and keeps in good working order for two or three weeks

The time needed to get relief in the acid bath is usually about five minutes, some matt papers requiring up to ten minutes White light may be used in the dark room as soon as the print is in the

acid bath The image before pigmenting is a fairly visible yellow-green The following papers have answered well with the process.—Wellington's platino-matt, special smooth, and cream crayon, Griffin's bromoil, Paget's matt, cream crayon, rough white, cream crayon card, and satin One of the easiest papers to get relief on is Paget's cream crayon, one or two minutes in the acid bath being generally sufficient for it

The pigment used throughout was Rawlins' black, mixed when required with ordinary house painters' boiled linseed oil, which is preferable to megilp, as it does not dry so rapidly nor take on a gloss

The above method works well with ammonium sulphocyanide, as advised by Hewitt (see above), the only drawback being that with the normal bleacher a much flatter print is obtained than with the acid and hypo For equal contrast and relief it is necessary to increase the acid in the bleaching solution by 50 to 100 per cent With this modification of the bleacher the sulphocyanide method gives satisfactory contrast, and allows of a print being obtained ready for pigmenting within twenty minutes —"A P," July 27, 1909, p 90.

Simplified Bromoil —The Ozobrome Company have issued directions for a simplified method of converting a bromide print so that it will retain greasy ink in proportion to the silver deposit The bleaching bath consists of

Ozobrome pigmenting solution as sold	1 part
Hydrochloric acid 1 per cent solution	5 parts
Water	4 parts

The hydrochloric acid solution is made by diluting 2 drs (fluid) of hydrochloric acid pure (sp gr 1 16) to 25 ozs The bromide print is placed in the above bleaching bath, and becomes in 1 to 3 minutes a faint yellow-brown in colour It is then placed direct in a fixing bath of

Water ..	20 ozs	1,600 c.cs
Hypo	2 ozs	160 gms.
Liq ammonia .	1 d (fl)	10 c cs

where it should remain from two to six minutes according to the original hardness of the bromide emulsion The hardness of the emulsion can be roughly gauged by the time the image takes to bleach

If the bleaching is complete in one minute or less it is an indication that the gelatine is fairly soft, and two or three minutes in the fixing bath would be sufficient, but if the time occupied in bleaching is two or three minutes or longer, the print should remain in the hypo from five to six minutes

Finally wash three to five minutes in running water After removal of the superfluous moisture the print is ready to ink up, or, if convenient, the print may be allowed to dry, in which case it will require to be soaked in water at a temperature of 60 deg to 65 deg F for about twenty to thirty minutes —"B J," Sept 10, 1909, p 706

Photogravure Effects with Bromoil.—C H Hewitt describes a method of taking an impression on plate paper (as used for photogravure) in a press from a freshly-made bromoil print The latter is damped on the back, laid on the bed of the press on a sheet of cardboard cut exactly to the size of plate-mark required Over the print a mask of thin paper is placed, the opening showing the amount of picture required The plate paper to receive the impression is now laid over the whole and a pull taken as in ordinary copperplate printing The ink leaves the gelatinised paper and adheres in full detail to the plate paper — "A P," March 2, 1909, p 199

Platinum Printing.

Improving Platinum Prints.—In some notes on the intensification of under-printed platinum prints, Dr John Bartlett gives the preference to Liesegang's method of treating the washed print with a solution of hydroquinone and citric acid, to which a little silver nitrate solution is added at the time of use The intensified prints are afterwards fixed in weak hypo This method did not give the rusty colour produced by the chloroplatinite intensifier When using stale platinum paper a little potass chromate (the yellow chromate, not the bichromate), added to the extent of 2 drops of 5% solution per ounce of developer will secure brilliant prints The developer should be used not warmer that 60 or 70 deg F —"Journ of the Franklin Inst," Mar, 1909, p 182

Iron Printing Processes.

(Other than Platinum)

Blue Prints.—Leslie Truss, in place of "developing" ferro prussiate paper in water, recommends the following on account of the greater brilliancy, clearness of the high-lights, and good detail

The negative print (i e, undeveloped), which should be slightly darker than is usually necessary, on being removed from the frame must be first bleached for about five minutes in the following —

Water	8 ozs	225 c c s
Liquid ammonia 0 880	40 mins	2 4 c c s

The ammonia should be added just previous to use and after immersion The print will be found to be a pale grey positive; this should be well washed for another five minutes in running water and redeveloped in—

Citric acid	200 grs	13 gms
Water	8 ozs	225 c c s

Development will be almost instantaneous, the colour being a decided green at first, and the blue print fully developed in about half a minute, after which ten minutes' washing should ensue. The finished print will be found to be quite equal in brilliancy to P O P, the high-lights being clear and unstained, and detail

showing well up in the half-tones Either oxalic or acetic acid, in concentrated solution, may be used in place of citric acid, but the latter gives the most brilliant results, and is the cleanest working bath of the three —"A P," Nov 24, 1908, p 492

True-to-Scale Process —This process, which has several different names, according to the firms exploiting it, is one by which a few copies (a maximum of about twenty-five) can be obtained rapidly in permanent printers' ink and without any distortion of size The process is so far only used for architects' and engineers' plans, and diagrams for patent specifications, etc These are made in the first place in good black ink on tracing paper or linen, and then exposed on to a piece of ordinary ferro prussiate paper, to make a "blue print" The print is not developed but immediately laid down dry on to a "graph," or jelly, thinly spread on a sheet of glass or zinc The print is just pressed into contact all over and then directly pulled away The jelly is now rolled over with a good letterpress ink, by means of a composition roller The ink will take only on the lines A piece of paper is now laid on the jelly and rolled over evenly with a light roller, and on lifting will carry the impression of the plan It is now necessary to ink up again before another copy can be taken If the work is done on a considerable scale it is convenient to arrange a press for the printing

The difficulty of the process consists in getting the jelly of the right composition Here are two formulæ which are said to answer well Dissolve —

Glue	8 ozs	225 gms
Water, to make	16 ozs	450 c c s

Add —

Gelatine (dissolved in water to make 2 ozs).	1 oz	30 gms
Ferrous sulphate	½ oz	15 gms
Glycerine .	½ oz	15 c c s

The second is —

Gelatine (Coignet's, 1s 1b)	1 lb	450 gms
Water	4½ pints	2550 c c s
Size powder	1 lb	450 gms
Iron alum (ferric ammonium sulphate)	1½ ozs	42 gms
Water	1 pint	570 c c s

Dissolve the gelatine in the water, then add the size powder Dissolve the alum in the water, then add to the glue solution gradually, stirring all the time If the "graph" smells unpleasantly, a little oil of cloves may be added.

The composition is melted by standing in hot water and then poured on to the slab for printing as soon as it has set, as described above After use it can be remelted and used again, but a little new composition should always be added It will be seen that the process is quick, easy, and cheap.—"B J.," May 7, 1909, p 364.

Molybdenum for Extra-Sensitive "Blue" Paper.—See "Molybdenum Printing Papers," under "Miscellaneous Printing Processes."

Ferro-gallic in Making Positive Copies Direct.—See "Contact Copies of Plans," etc., under "Copying."

*Miscellaneous Printing Processes and Prints on Various Supports.

Prints in Greasy Ink from Bromides.—A German patent of A. Tellkampf (No. 201,968 of 1905) describes the use of a bleaching solution of ferricyanide for the production of a printing surface from which proofs in greasy ink may be taken. The ferricyanide bleached print is applied to a gelatine film containing a ferrous salt (prepared from a mixture of 100 gms. of gelatine and 1 gm. of ferrous sulphate in 600 c.c.s. of water). The unaltered ferricyanide in the print combines with the ferrous salt, producing an insoluble salt in the gelatine, which, after this treatment, is able to absorb a fatty ink. From the relief film thus obtained, prints are taken off by contact.—"Journ. Soc. Chem. Indus.," Nov. 30, 1908, p. 1,132; "B. J.," Dec. 11, 1908, p. 937.

Prints on Parchmentised Paper.—L. Griffith has succeeded with the following process, by which plain paper is first parchmentised in an acid bath, home sensitised, a faint image printed, and full strength obtained by development. The acid bath is:—

Sulphuric acid, strong	4 ozs.
Water	4 ozs.

The paper is immersed in this, quickly raised up, placed on a glass to see that all bubbles are removed, again immersed, and again placed on the glass the other side up to make sure of complete removal of air-bells. A wash in three changes of water, and a further short soak in water containing a little ammonia complete the process, the paper being pressed between blotters and hung up to dry.

To prepare a sensitive surface on this paper, which gives beautiful rich-looking proofs of pleasing brown colour, make the following solution:—

A.	Potass. iodide	1 gr.	0.065 gm.
	Cadmium bromide	½ gr.	0·032 gm.
	Barium chloride	10 grs.	0.65 gm.
	Sugar	10 grs.	0.65 gm.
	Water, impregnated with camphor . . .	1 oz.	30 c.c.s.

Camphor in aqueous solution may be had of the apothecary.

Take a flat, smoothed, dry sheet of the prepared paper and apply this salting solution with a brush or wad of cotton in the usual way.

Let it lie flat for a minute or two, then hang up to dry When dry it is ready for the sensitiser —

B Nitrate of silver	100 grs	6 5 gms.
Citric acid	4 grs	0 26 gm
Nitrate of uranium	60 grs	3 9 gms
Distilled water	2 ozs	60 c c s
Alcohol	½ oz.	15 c c s

Dry quickly, but not too near the heat Expose until the image is faintly visible, about as in a platinum print

The developer consists of - -

Py	4 grs	0 26 gm
Citric acid	8 grs	0 52 gm
Acetic acid (glacial)	1 dram	3 6 c c s
Water	8 ozs	225 c c s

The development is rather slow being retarded by the quantity of the acid, but this is advantage The dish is kept in motion during the development

Develop the image until it shows considerable intensity, as it weakens somewhat in the fixing-bath

FIXING-BATH

Hypo	½ oz	15 gms
Water	8 ozs	225 c c s
Alum	2 drms	8 gms

Fixing is accomplished in fifteen or twenty minutes The print is now placed in—

Alum	50 grs	3 2 gms
Water	8 ozs	225 c c s

Let it remain in this bath for half-an-hour or more, until it assumes a rich brown colour Wash as usual with other prints — "Bull Phot," Mar 3, 1909, p 137

Molybdenum Printing Papers—The Neue Photographische Gesellschaft has patented (Ger pat No 206,320, May 9, 1907) the use of molybdenum compounds for the making of papers intended for copying plans, etc The papers are developed after exposure to light by means of a ferricyanide which forms with the molybdo-molybdate produced, an insoluble, stable, highly coloured image Eighteen gms of molybdenum trioxide are added to a solution of 20 gms of oxalic acid in 400 c c s of water, by crystallisation a mixture of oxalic acid and molybdic acid is produced, which can be coated on paper For blue tones the developer may contain ferric chloride, potassium ferricyanide, and oxalic acid, for brown tones uranium nitrate, and for red tones copper sulphate is substituted for the ferric chloride The sensitiveness of ferro-prussiate papers is increased by addition of molybdic acid, thus paper may be immersed in a solution of 3 gms of molybdic oxalic acid mixture, 2 5 gms of potassium ferricyanide, 0 5 gm of oxalic acid, 1 gm of sodium chloride, 12 gms of ferric ammonium citrate, and 3 gms of gelatine in 100 c c s of water After exposure to light these papers are developed by water

"Askau" Pigment Prints.—A process has been worked out in Germany by J. Rieder in which use is made of caoutchouc and asphalt in order to form a film capable of fixing to itself a dry pigment powder in proportion to its degree of exposure to light. Caoutchouc alone possesses too little sensitiveness; a small proportion of asphalt remedies this defect. A coating of this mixture is applied to paper, forming a sensitive material which will keep for a month. Printing, as in other dusting-on processes, must be done from a positive transparency, and the exposed sheet of paper "developed" with a mixture of sea-sand and a suitable pigment, which latter adheres to the light-affected portions. The only remaining part of the process is to "fix" the print by applying a lac varnish by means of an air-brush.—"B. J.," Jan. 29, 1909, p. 78.

The Pepper Process.—W. W. Wall gives a revised formula for this variety of the dusting-on process, by which a sensitive coating may be applied to almost any surface, and an image developed by means of powder in nearly any colour or material:—

A.	White pepper	½ lb.	225 gms.
	Benzole	20 ozs.	570 c.c.s.

B.—Solution of 1 in 20, gum dammar and benzole.

C.—Solution of indiarubber in benzole, fairly thick (bicycle cement will do).

For use, take A 10 ozs., B 1 oz., C 1 oz. Filter, and one is ready to coat any hard glazed surface, as glass, opal, or hard-sized white paper, such as the Autotype Company supply. The next procedure is to expose for a few minutes in the sun under a transparency, and then dust over with any litho dry colour, or powdered metals, as gold, silver, bronze, etc., and with a final brushing with a clean soft brush the whole thing is complete.—"A. P.," June 22, 1909, p. 589.

Ceramic Photographs.—M. Anthes and E. Lloyd have patented the use of sensitising solution of honey or other sugar, nitro-cellulose dissolved in ether or acetone with alcohol or other liquid capable of rendering the ether or acetone miscible with water, and, lastly, ammonium or potassium bichromate. This sensitising solution is used as a basis for the dusting-on process.—Eng. Pat., No. 24,214, 1907; "B. J.," May 15, 1908, p. 382.

CATATYPE PRINTING.

Methods of Catatype Printing.—A review by Dr. E. Stenger of the stages in the development of the catatype printing process, and a description of the manipulation of the materials supplied appears in "Moderne Photographische Kopierverfahren," published by W. Knapp.—"B. J.," Aug. 20, p. 647, and Aug. 27, p. 669, 1909.

THE DONISTHORPE PROCESS.

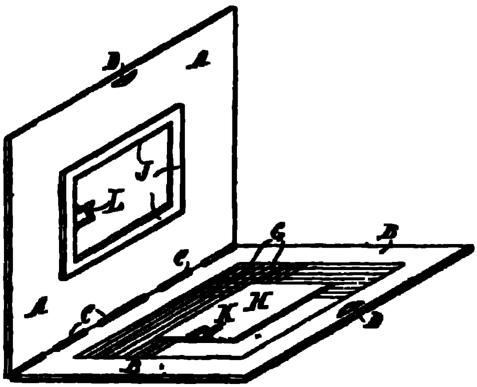
Opaque Sensitive Film.—For use in conjunction with the dye method of preparing prints by contact in the dark ("B. J. A.," 1909, p. 623), E. S. Donisthorpe has patented an opaque sensitive

film, in which the support for the emulsion may be black paper, opaque pigmented celluloid, etc.—Eng. Pat., No. 5,641, 1908, "B.J.," Apr. 16, 1909, p. 310.

F. W. Donisthorpe has patented an opaque photographic plate, providing a rigid support for the emulsion, of ebonite or black glass, or, it is stated, of paper.—Eng. Pat., No. 7,087, 1908, "B.J.," Apr. 30, 1909, p. 348.

Mounting and Mountants.

Dry-Mounting Embossing Folder.—G. W. Morgan has patented a method of embossing or plate-marking prints at the time of dry-mounting. For this purpose a folder is used consisting of two plates jointed at one side and made of metal sufficiently thin to be easily bent. The folder is opened and a mount to which it is intended to attach a photograph is laid on one of the plates, then the photograph to be attached is laid on the mount, put in correct register, and the other leaf of the folder is gently closed over. The whole is then placed under the mounting apparatus and receives the necessary pressure to secure adhesion.



The plates may conveniently be of different finish to each other, for example, one of them may be highly polished to impart a glossy surface to the print, and the other finely ground or matt surfaced for a like purpose.

The example shown is adapted for plate-marking, and it may be also used for embossing the mount. There is provided upon the ruled plate B a marking plate H—which may also be surfaced to impress the print. Upon the opposite plate A is a frame J within which when the plates are folded together the marking plate H fits. A device such as the monogram K may be formed in intaglio in the marking plate H, or be attached thereto, while the counterpart relief L is formed in or attached to the plate A.

In operation, the folder is opened; the print laid face down in proper position upon the marking plate H; the mount—of course, of sufficiently thin material—is superposed and the whole closed and subjected to pressure.—Eng. Pat. 3,727, 1908; "B. J.," Dec. 4, 1908, p. 928.

Some further particulars of the system and of the self-adhesive paper to be supplied coated with print-out or development emulsion are given in an account of the demonstration of the process held at the premises of Messrs. O. Sichel and Co., in "B. J.," Apr. 9, 1909, p. 292.

A later article by G. W. Morgan appears in "B. J.," Apr. 23, 1909, p. 325.

Dry Mounting.—In using an ordinary flat iron for applying heat to the print in attaching it to the mount by means of shellac tissue, G. Bealby recommends the use of the yellow copying-press paper (as sold by stationers) for laying upon the print when applying the iron. For keeping this latter, or, rather, two of them, at a convenient temperature, between 180° and 212° F., two irons are placed in a large shallow dish containing about an inch depth of water, which is kept at the boil over a gas stove. One iron or the other is thus always at the necessary heat, and dries almost instantly on being taken from the water.—"A. P.," Feb. 16, 1909, p. 153.

Gutta-percha Dry-Mounting.—Dr. J. Neubronner prepares a dry mounting film or tissue by coating paper on both sides with a solution of gutta-percha, or passing paper through a solution of the latter. The paper is then treated by heat in order to saturate the pores with the liquid. It then becomes semi-transparent and of the appearance of parchment, and is dried and rolled. This may be done without fear of its sticking. The tissue is placed between the mount and the photograph, and, on application of heat, unites the two, the gutta-percha acting as an insulating film and protecting the photograph from impurities, if any, in the mount.

The gutta-percha solution may be applied to the back of the photograph and the latter affixed directly to the mount by hot pressure.—Eng. Pat. No. 13,253, 1908; "B. J.," Dec. 25, 1908, p. 964.

Enlarging.

Vertical Enlarger with Supplementary Lenses.—Dr. H. D'Arcy Power records the great convenience of a vertical or skylight type of enlarger in which the negative is laid on a horizontal shelf (fixed), the lens mounted on a similar fixed shelf (A in Fig. 1), and a series of shelves provided below for different scales of enlargement. The same lens is used throughout, but is combined with a positive supplementary lens (shortening the focus), when a lesser degree of enlargement is required than that which the lens alone will give within the limits of the apparatus. Thus, in the case of a 7-inch

lens placed 8½ inches from the negative and 42 inches above the floor an enlargement of four diameters is obtained. The following

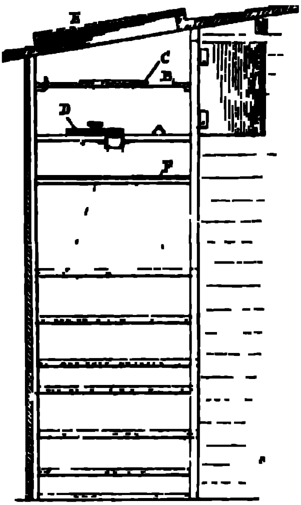


Fig 1

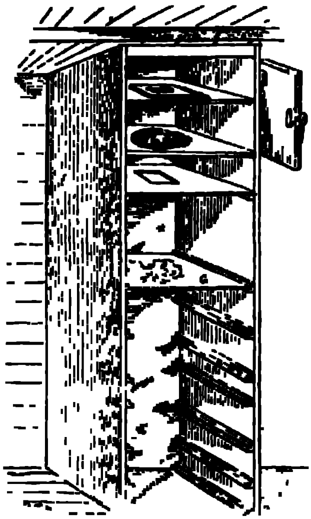


Fig 2

table gives the spectacle lenses required, the distances from lens to sensitive paper (for sharp focus), and the magnifications thus obtained —

Lens	Distance to Paper Shelf	Magnification
inch lens al	41½ inches	4 diameters
inch lens plus 0 12 spectacle lens	38 inches	3½ diameters
inch lens plus 0 25 spectacle lens	34½ inches	3¼ diameters
inch lens plus 0 50 spectacle lens	29 inches	2¾ diameters
7-inch lens plus 1 00 spectacle	26¼ inches	2½ diameters
inch lens plus 1 25 specta	21¼ inches	2 diameters
inch lens plus 2 00 spectacle lens	16¼ inches	1¾ diameters

It will be seen that the supplementary lenses are mounted in a rotating disc, D, so that any one can be quickly brought into position The positions of the focussing easel or paper are best found by trial with a test plate The method further lends itself to vignetting and printing-in clouds —"Cam Craft," May, 1909, p 163; "B J," June 18, 1909, p 475

Calculating Exposures in Enlarging by Artificial Light —N C Deck uses a density scale negative as a means of classifying nega-

tives and estimating exposures in enlarging The method applies to negatives all made with the same developer which has also been used in making the scale negative This latter is printed by contact from a set of graduated strips built up like the multiple-tint actinometer frequently used Ten gradations representing from one to twenty-six thicknesses of fairly transparent paper are numbered On the negative the most transparent set is marked 1, and so on From each of the negatives to be used a perfect contact bromide or gaslight print is taken, exposing and developing both at the same time The highest number which can be read in the gradation images is thus the "density number" of each negative

In enlarging, the ordinary negative is first adjusted in the carrier and the enlargement focussed The gradation negative is then inserted and trial strips of bromide paper exposed across the numbered bands of the gradation negative, giving a series of seven exposures, each double the preceding, from 10 to 640 seconds The strip is developed and fixed, and the number produced at each exposure noted As these strips will show a series of density numbers, it will be clear that under the working conditions at the time the exposure for a negative found to have a density number of 14 will be that required to produce No 14 on the test strip If the scale of the enlargement is changed allowance must be made for the fact -- "Aust Phot Journ," Nov 20, 1908 p 322

Focussing Enlargements Near to Easel —W Pollock has patented a gear mechanism providing an adjustable rod affixed to the rack and pinion of the camera This latter may be actuated from the other end of the rod, which is close to the easel, and thus allows of the enlargement being focussed whilst the operator closely examines it Eng Pat No 21,328, 1908 —"B J," Jan 8, 1909, p 28

Soft Enlargements —Andre Callier has shown that if the "scatter" of light from a negative be prevented by binding the surface of the negative with a piece of opal glass the increased contrast which is produced in an enlargement is obviated —"Phot Journ," Apr 1909, p 200, and "B J," Apr 30, 1909, p 343 (see under "Negative Processes—Sensitometry")

In Place of Bolting Silk —H Mills uses chiffon (two thicknesses) placed in the rim of a lens cap on the hood of the enlarging objective. This he finds to give a certain softness of definition without, however, destroying detail —"A P," Aug 24, 1909, p 190

Ernest Marriage advises the use of a portrait lens such as the Dallmeyer B, adjusted for soft focus, in place of using bolting silk for making soft enlargements The enlarged print is free from "textile" structure, and exposures are less The method has the advantage over using an ordinary lens and putting the image out of focus that the fine detail in the negative is preserved in the enlargement —"A P," Oct 5, 1909, 334

Enlarged Negatives on Paper and Glass.—See "Reproducing Negatives," end of Section IV—"Negative Processes"

Photo-Sketches—Nelson K Cherrill has suggested the making of enlarged prints from negatives purely by a hand method, which consists in projecting the negative upon a sheet of white absorbent paper, such as Whatman's water-colour sketching board, and after sharp focussing proceeding to fill-in with brush and colour all the light parts seen on the paper, so as to obtain one uniform tint all over This is done by a weak light, such as that of a candle placed five or six feet from the paper in the case of a 15 x 12 enlargement projected from quarter-plate with an eighty candle lamp The result is to place upon the paper an image which is the positive corresponding to the negative It is stated that the work calls for no special skill—"Phot Monthly," May, 1909, p 97

Lantern Slides.

Lantern Slides Direct in the Camera—Douglas Carnegie has further simplified the method of making diagram slides direct in the camera by reversal ("B J A," 1909, p 632) by exposing through the glass of the lantern plate, the focussing screen of the camera being likewise reversed On account of small differences which may exist between the thickness of the lantern plate and the focussing screen, the lens is used stopped down to $f/11$ The developer is —

A	Metol	24 grs	1 8 gms
	Hydroquinone	90 grs	6 8 gms.
	Sodium sulphite	2 ozs	65·0 gms
	Potassium bromide	40 grs	3 0 gms
	Water	30 ozs	1000 c c s
B	Sodium carbonate (crystals)	2 ozs	65 gms.
	Water	30 ozs	1000 c c s

For use, equal parts are taken of A and B In very warm weather it is advisable to increase the amount of bromide This developer is very well suited to intermittent work, as it has excellent keeping qualities

Metol is used in this formula in order to allow of the use of sodium carbonate as the accelerator, caustic soda or potash not being suitable for the process

The exposed plate is placed, film up, in the developer, covered, and left for five minutes At the end of development the image should be clearly visible on the film surface The plate is now well rinsed in the dish for one minute, and then flooded with the reversing solution, by which the silver image is dissolved When rinsing the plate should always be temporarily removed from the dish, and the dish itself rinsed out Otherwise solution is persistently retained by the capillary space between the plate and the dish bottom

In place of potass bichromate as the reverser amonium bichromate is used, this formula avoiding the slight opalescence of the film caused by the potass salt. The reverser is.—

Ammonium bichromate	300 grs.	17 gms
Nitric acid (concentrated)	3 drs., fl	9 3 c.c.s
Water	40 ozs	1,000 c.c.s

Two or three minutes' immersion of the plate in this solution will wipe out the densest silver image The plate, having been well swilled again for one minute after removal from the bichromate bath, is ready for re-exposure and re-development

Since during the re-exposure the plate must be exposed in the developer *glass side up*, provision must be made that the film itself does not come into contact with the bottom of the developing dish This is secured by sticking (by means of coaguline) narrow strips of glass on the bottom of the tray (preferably a black one) at either end, so as to act as small shelves for the plate The previously used developer is poured into the dish; one end of the plate, itself held in a slanting position, is immersed, and then the other end of the plate gradually lowered, till it is completely immersed This method of inserting the plate must be followed, for air-bubbles in contact with the film would be fatal If the plate is first placed in position on the shelves in the dish and the developer then poured in, bubbles are a moral certainty The plate is rocked in the developer for half a minute, the dish placed on the floor, and three-quarters of an inch of magnesium ribbon is burned at a vertical distance of 3 ft above it The plate is then left covered for five minutes, when secondary development will be complete Fix in an acid fixing bath and wash

When soft results are required (as, for instance, in making a slide from a photograph with a delicate range of tone gradation), magnesium light should not be used for the reversal exposure In such cases the weaker light of a number 4 flat-flame gas burner is to be preferred The light from a gas pedestal, about a foot high and standing on the table, may be conveniently reflected by means of a mirror on to the plate as it lies glass side up in the developing dish The mirror is clamped at an angle of 45° to the vertical a foot above the dish, and the gas flame is placed some 18 ins from the mirror The light is kept on during the whole time of development, the duration of development being now regulated by inspection of the plate and the character of the slide required

Even if there be no appreciable fog, short immersion in a reducing bath always enlivens and brightens up a diagram slide The best method of procedure is as follows —Place the plate for a minute or so in water to which enough potassium ferricyanide has been added to colour it distinctly yellow Wash, and then immerse in a *very* weak hypo bath If there has been fog or veiling of the background, and it is not yet removed, repeat the process Do not expect the veiling to disappear in the ferricyanide solution This plan of applying the Howard-Farmer reducer in stages removes fog or veiling without detracting from the pluckiness of the image, as the employment of the mixed reducer is very apt to do —"B J," July 9, 1909, p 528

Masking Diagram Lantern Slides at Time of Exposure.—Douglas Carnegie has devised the following copying easel, serving to obtain masking of a diagram or other original when copying for lantern slides, the method having the advantage that it dispenses with a paper mask in the slide, and thus avoids the dewing of slides in the lantern resulting (to some extent) from moisture in the mask. The diagram to be copied is trimmed up square, and the copying-board on which it is supported during exposure is covered with the best black velvet. For the purpose of fixing diagram to the copying-board—a plan which gives truly rectangular masking—two thin slips of wood of the same length as the board, and about 2 ins. wide, are bevelled off sharply along one edge. The slips are then covered both sides with black velvet, using Higgins' vegetable glue as adhesive.

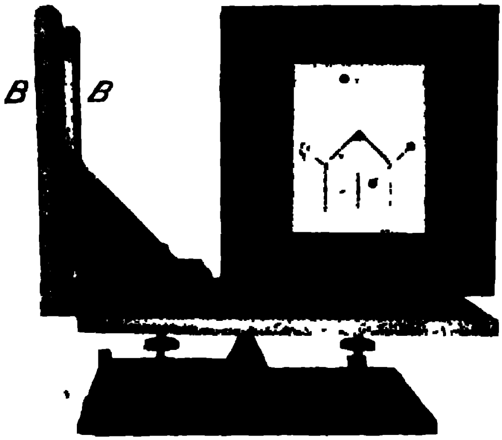


Fig. 1.

If the diagram is placed in position on the board, and the covered laths be pressed on the board so that their bevelled edges slightly overlap the right and left-hand edges of the diagram, they will adhere to the board and firmly support the diagram, in virtue of the interlocking of the piles of the opposed velvet surfaces. Fig. 1 represents the copying-board with a diagram fixed thereto as described, the dotted lines touched into the print indicating the positions of the photographically invisible supporting laths.* Fig. 2 represents the arrangement of the board when copying from books. The method of supporting the book by the adjustable brackets B B is indicated. The dotted lines again show the position of the lath, which is keeping the page taut and flat against the surface of the

* The copying-board as described is supplied to order by Messrs. Butcher and Curnow, Blackheath.

board. The hinder edge E of the board is bevelled off, so as to fit snugly into the angle that a reflexed book presents. By this device a perfectly flat page is expeditiously secured, and this without any detriment to the book Unfortunately, there is no avoiding the ordinary paper masking in the case of copying diagrams which only form portions of a book page.

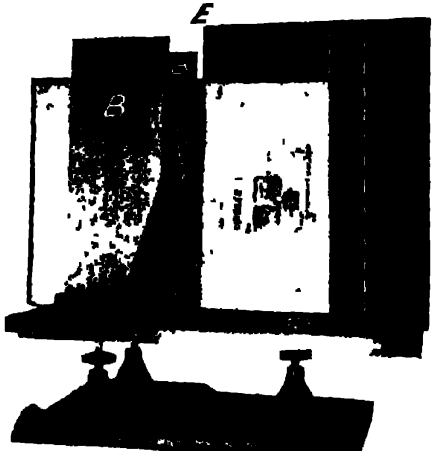


Fig 2

As regards binding, it is of little avail to dry the slide and its mask if the finishing touch is the application of a substance so hygroscopic as gum The adhesive tape sold for surgical purposes is a very efficient binder, but it is rather coarse and unsightly The same objection of unsightliness and lack of finish unfortunately applies to the method of fixing the cover-glass by an edging of "Cementium" or Stickphast cement There would seem to be a good opening here for the trade to supply an easily applied dry adhesive binding *—"B J," July 9, 1909, p 528

WARM-TONED LANTERN SLIDES

Diachrome Toning—E Coustet states that the following solution acts perfectly for the bleaching of transparencies to be toned by the Traube method ("B J A," 1909, p 631) —

Potass iodide .	5 gms	80 grs
Water	enough to cover	
Then add, and stir still dissolved—		
Iodine . . .	2 gms	30 grs
Water to make . .	100 c c s	3½ ozs.

* Dry adhesive binding is supplied by J Neubronner and Co, Cronberg on Taurus, Germany.—Ed "B J A"

The slides are bleached in this solution until white or yellowish when seen from the back, and are then rinsed, and dyed in one or other of the colouring matters suitable. M Coustet mentions methylene-blue, auramine, and erythrosine A longer list was given in the 1909 "Almanac," p. 631, by Dr. Novak —"Photo-Gazette," Sept 25, 1908, p 199

Warm Tones on Lantern Plates —Messrs. Wratten have found that the fineness of division of the silver image is the cause of warmness of tone in lantern plates, a fact which has led them to work out a bromide lantern plate, with which type of emulsion developers containing solvents of silver bromide, such as hypo, etc, may be used as a means of forming a very fine (warm-toned) image As a result, also, of the image becoming coarser in grain as development proceeds, they recommend the alteration of the developer as well as of the exposure for obtaining any given colour, a fixed time of development being adopted for each developer They also find that a fine series of bluish tones may be obtained on the bromide plates by means of an acid (physical) developer consisting of

Metol	88 grs	2 gms
Citric acid	1 oz	10 gms
Water	10 ozs	100 c c s

To which add one tenth of its volume of 10 per cent silver nitrate solution

The exposure in this case requires to be about four times the normal, and dishes, measures, etc, must be used scrupulously clean —"B J" (from "Lantern Slides," issued by Wratten and Wainwright), Sept 17, 1909, p 726

Increasing the Power of Limelight —C E S Phillips draws attention to a very simple method of increasing the power of limelight, and his expedient may at times be very useful He simply puts an incandescent mantle over the lime —"B J" (from "Nature"), Nov 20, 1908, p 882

Douglas Carnegie reports that tests made with both hard and soft limes with and without an incandescent mantle showed no measureable improvement produced by the latter - "B J," Mar 12, 1909, p 206

CINEMATOGRAPH

Non-flammable Cinematograph Film —A Lumière et ses Fils prepare a film which, when finally used in the cinematograph machine, consists only of gelatine They coat a polished glass surface with collodion to form a temporary support They then apply a gelatine coating sufficiently thick to serve as a cinematograph film when detached, and finally apply the emulsion coating to the collodion gelatine film The combined film is exposed in the cinematograph printing machine, and is developed, fixed, dried, etc, in the ordinary way The collodion support is then stripped away from the gelatine film and the latter used alone —Eng Pat No 16,114, 1908, "B J," Apr 23, 1909, p 328

Cinematography in Natural Colours.—G. Albert Smith, in conjunction with the Chas Urban Co, has worked out a method of cinematographic projection in natural colours, which was very successfully demonstrated before the Royal Society of Arts on December 9. The method employed is a development of the additive process, except that Smith uses only two filters, a red and a violet, in making and projecting his colour records Commercial cinematographic film is bathed in a dye bath to give it the necessary colour sensitiveness The filters are mounted as sectors in a rotating disc, a similar disc being used in the projecting machine Thirty-two pictures, sixteen for each sensation, are taken per second, and are combined in the eye of the observer when projected on the screen The results shown were remarkably good, and several cinematographic renderings of scenes which in the quiescent state had been photographed on Autochrome plates showed the range of colours rendered on the two-colour system -"Journ Soc Arts,' Dec 11, 1908, p 70, "B J," Dec 18, 1908, p 960

Capt W N Lascelles Davidson has patented a modification of the two-colour method of cinematography in colours by additive projection, the essential part of the invention being the use of colour filters travelling over the band of sensitive film (at the time of exposure) or with the positive film (at the time of projection) at about the same rate

Instead of employing a revolving shutter fitted with, say, red and bluish-green colour screens as described in Patent No 26,071, 1906, there is used a length (preferably an endless band) of multi coloured film, which is caused to travel in any suitable manner with, or at about the same speed as, the colour sensitive film, the band of film being so coloured or dyed that the respective colours thereon are the size of each of the series of pictures exposed through the colour screens throughout the film

A series of negatives is thus obtained in which, say, the reds and yellows are recorded in one negative, and, say, the blue-greens and yellows in the second alternately throughout the length of the film

A series of positive colour records (preferably of a neutral grey black tint) are made from the above negative colour records, and projected on the screen through any commercial projecting machine with a similarly coloured multi coloured colour screen, so that the pictures are projected in quick succession in the desired order through their respective colours

There can thus be obtained one picture to every complete revolution of the exposing or projecting shutter, and it is thus possible to both take and project pictures in colours at about the same speed as ordinary black and white animated pictures --Eng Pat No 253, 1908, "B J," Feb 12, 1909, p 126

(Space will not permit of reference to the numerous patents for cinematograph cameras and projectors The specifications are published or abstracted in "The British Journal of Photography," and entered in the annual index of that publication under (1) *Cinematographs and* (2) *Name of Patentee)*

VI.—COLOUR PHOTOGRAPHY.

Patents for Colour Photography.—The chronology of the patent specifications relating to colour photography commenced in the monthly "Colour Photography," Supplement to the "British Journal of Photography," is concluded with the issue of December 6, 1907, p. 96.

Experiments in Colour.—A description of apparatus used by the Leipsic School of Graphic Arts in teaching the principles of light and colour and exhibited at the Dresden Exhibition is given in "B. J.," June 18, p. 476, and June 25, p. 499, 1909.

Direct Interference Processes (Lippmann).

The Lippmann Process.—H. E. Ives has made a series of experiments in order to discover the most favourable conditions (of thickness and grain of emulsion, developer, etc.) for the reproduction of (1) pure monochromatic colours, (2) mixed colours, (3) white, and (4) natural scenes. In the course of his experiments he found that what is best for one of these is not best for others, and he further worked out a portable substitute for the mercury mirror, of particular value when using the Lippmann process in the field.

The following are his directions for making the latter. A glass plate is heavily silvered, and then flowed with a thick solution of celluloid in amylacetate. When this varnish is dry, the plate is placed under water; this slowly works under the coating of celluloid, lifting it from the glass, and *bringing with it the silver*. This flexible silver mirror is immediately laid, silver surface down, on a wet Lippmann plate, and allowed to dry there, a necessarily somewhat slow process. When dry, the gelatine film has the silver surface in optical contact with it. The plate may then be exposed at any time in an ordinary plate-holder. After exposure, the celluloid film is stripped from the gelatine, taking with it most of the silver, the plate developed, and after thorough washing the remains of the silver removed with a tuft of wet cotton.

This substitute works perfectly for all types of colours, and, except in the laboratory, where a convenient dark-room makes the use of the mercury mirror simple, facilitates the practical working of the process.

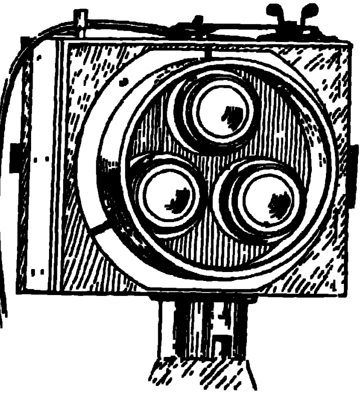
A difficulty which has proved rather troublesome is that some of the best sensitisers are apt to lose their effect during the slow drying Erythrosin acts perfectly, pinacyanol and pinaverdol are apt to fail This can probably be overcome, either by different choice of sensitisers, by so treating these that slow drying does no harm, or perhaps by finding some more porous substance than celluloid, which, acting the same in other respects, will permit of quick drying Collodion has been tried, but has not been found to strip off the gelatine well —" B J " (from "Astro Physical Journal"), Dec 11, p 942, Dec 18, p 965, Dec 25, p 979, 1908

Dr H Lehmann, of Jena, gives a full description of the contributions made by himself to the Lippmann process in "Phot Rund," Heft 11 1909, p 125 Reference is made to the grainless plate for the process now made by R Jahr, of Dresden, and to the portable mercury dark-slide, viewing instrument, and projection lantern made by Carl Zeiss

Three-Colour Processes.

APPARATUS FOR THREE COLOUR PHOTOGRAPHY

A Three-Lens One-Exposure Colour Camera - A Cheron, who has in the past devised several cameras for obtaining colour photographs at one exposure by dividing the image formed by the lens into a series of spectra ("B J A," 1909, p 668), has now adopted



as more simple and practical for ordinary work a camera made with the three lenses placed as close together as the mounts will permit, the body of the instrument being divided into three compartments of triangular shape As shown in the photograph, all three lenses can be uncovered at once with a cap or shutter, and the rim also serves for the attachment of one large lens when photographing near

objects The filters (Wratten) are contained in the camera, and a single negative gives three colour sensation records about 1¼ ins diameter A positive from this negative is placed in the camera back and suitably illuminated, a large lens (placed over the three taking lenses) thus allowing of the small pictures being projected in colours For discs up to 3 ft diameter an ordinary incandescent alcohol lamp is found sufficient Though not theoretically perfect, the method gives satisfactory projections on this small scale — "Phot Coul ms," Jan, 1909, p 11, "B J" (Colour Supplement), Mar 5, 1909, p 21

[It should be mentioned that the device of employing three lenses placed as close to one another as possible, as illustrated by M Chéron, has already been suggested by Hans Schmidt (B J Feb 8, 1907, p 694) Herr Schmidt, however, by the use of two prisms caused the images to fall on three separate plates Also Sydney L Young writes in the B J (Colour Supplement), Apr , 1909, that a similar camera with three lenses mounted together has been used by him for three or four years previously

Lens for Colour Photography -A patent has been taken out by the S A La Photographie des Couleurs, J Sary, and E Bastyns for a lens composed of two, three or more glasses of prismatic triangular form, so as to form three separate images Eng Pat No 27,493, 1908 - "B J," June 18 1909, p 481

Three-Colour Prints.

Three-Colour Pigment Print —E Clifton and A E Wells have patented improved methods of preparing colour prints by the carbon or other process, such as Stannotype, in which gelatine reliefs containing a pigment or colour are laid one on each other to form the colour print In order to obtain a number of prints even or uniform in character they use a series of dye solutions in one or other of which any one of the component prints is immersed in order to strengthen or modify its colour Thus, the yellow print may be given a bath of red orange, or blue dye, the blue print may be dipped in a solution of yellow dye to render it greener, and the red print may be treated with a blue or violet dye to increase its purple character As suitable dye for the purpose the authors name for the blue, induline blue, Lyons blue, or Hoffmann's violet (blue shade), for the yellow dye naphthol yellow or berberine, for the orange dye, chrysoidine or aurine, for the red dye, alizarine, cochineal red (or carmine with ammonia) or Magdala red These dyes are used of a strength of about 25 parts of dye per 1 000 parts of water or weak alcohol

The second improvement in the process consists in means for examining all three prints placed in such a way that the final result may be judged For this purpose the prints are arranged in a registering frame provided with adjustments whereby the three differently coloured images whether supported on glass or celluloid may be brought into coincidence although separated by a small

space, as must be done owing to the dampness or wetness of the prints The diffused effect caused by this separation is avoided by observing the print (reflected in a mirror placed at a considerable distance) by means of a telescope close at hand Observation having then shown that the colour prints have been properly adjusted for tint and depth they may be successively transferred to a prepared paper or piece of celluloid, as in the double transfer method of carbon printing

In order to facilitate the registration marks are photographically produced on the negatives made in the first instance, and thus occur on all the prints – Eng Pat No 23 615 1907, "B J ," Feb 26 1909, p 163

Three Colour Prints by Modified Diachrome Process R Namias has suggested the use of lead sulphate and of lead oxide for fixing dyes as in the diachrome process of Traube ("B J A ," 1909 p 631) A positive transparency is bleached in a solution of lead ferrocyanide, washed for half an hour, treated for ten minutes in a 2 to 3 per cent solution of nitric acid to remove traces of lead oxide, and then placed in 10 per cent, hypo solution to remove the ferrocyanide of silver but to leave an image of lead ferrocyanide

The yellow image of a three colour print may be formed by treating the lead ferrocyanide positive with 5 per cent solution of potass bichromate This, when making a print on opal support to be viewed by reflected light only

For the three colour transparency the positive plates treated as above are further placed in an acid solution of sodium sulphate, which converts the image into one of sulphate of lead This acts as a mordant of the dyes, auramine proving suitable for yellow, saffranine for red, and methyl blue for blue In order to remove the lead sulphate from the dyed plates the latter are first treated in 1 per cent copper sulphate solution, and then placed in hypo solution containing boric acid

If instead of treating with acid sulphate solution, a 1 per cent solution of caustic potash be used, the image consists of hydrated oxide of lead, which serves to fix the colours, and is less opaque than the sulphate so that there is no need to remove it – "Phot Couleurs," July, 1909, p 145, "B J (Colour Supplement), Sept 3, 1909, p 69

One-Plate Three-Colour Processes.

PROCESSES OF PREPARING SCREEN PLATES

Under this heading are described processes, the product of which at the time of writing (Sept, 1909) are not on the market – Ed "B J A"

Lumière Screen Plate An English patent has now been granted to the Societe Anonyme A Lumiere et ses Fils for the process of preparing a screen plate of geometrical design described in "B J A ," 1909, p 642 – Eng Pat No 20,111, 1908 , "B J ," May 7, 1909, p 366

Dufay Screen Plate.—The full specification relating to the Dufay screen plate, No. 11,698, 1908, is given in "B. J.," Mar. 19, 1909. The details of the process have already been published in "B. J. A.," 1909, p. 642.

Some further details are given in an article by "T. R." in "Phot. Couleurs," Mar., 1909, p. 59.

A further patent has been taken out by M. Dufay, in which a greasy resist is used in the first instance, the plate being then dyed in the unprotected parts, varnished with a preparation which does not dissolve the resist, and the resin of which is insoluble in a solvent of the resist. The varnish may consist of gum-lac dissolved in alcohol. A solvent of the greasy material, e.g., benzole, is then applied, and the surface (thus laid bare) given a second application of the resist over half each area only and again dyed. Finally, after a second removal of the resist a third colour is put in by dyeing the plate as a whole. Eng. Pat. No. 18,744, 1908, "B. J." Oct. 8, 1909, p. 786.

Gelatine Grain Process. J. Bamber has patented a method (for application to celluloid) of forming the three-colour mosaic filter by means of a mixture of coloured grains of transparent gelatine, which are applied to the sheet of celluloid, allowed to expand by standing in moist air, or by application of a gelatine solution then dried and rolled into contact with the celluloid, and finally varnished. The process is similar in principle to the Lumière starch grain. The coloured gelatine particles are said to be made by first dyeing the gelatine, soaking in 15 per cent. formaldehyde, again drying, immersing in water in order to produce maximum expansion, and then (the gelatine being now in a brittle state) reducing to a fine granular condition in a grinding mill at a temperature of about 200° F. The gelatine powder is then separated into grains of various grades of fineness by a process of elutriation, using petroleum spirit of 0.700 sp. gr. or other liquid not absorbed by gelatine. In this way batches of grains up to a fineness of 1/5000-in. in diameter are stated to be obtainable.—Eng. Pat. No. 3,252, 1908.—"B. J.," Oct. 16, 1908, p. 796.

Ceramic Screen Plate.—H. W. H. Palmer has patented a method of preparing the screen plate for colour photography on the lines of the Autochrome plate, by the following method:—Glass plate is first of all coated with a suitable tacky substance, and then with ceramic colours or fluxes in the proper proportions of the necessary colours to form a three-colour filter plate. This coloured coating is then fired in a kiln or furnace, leaving a coloured transparent glaze formed of the minute particles of the colouring matters. The treatment in the furnace fills up any minute space between the coloured particles. The colours used are composed of silica, minium and borax (with saltpetre, added if necessary). This base is coloured with oxide of cobalt for the blue, copper oxide or oxide of chromium for the green (with the addition of ferric oxide to either of the former for the red), ferric oxide or chromate of lead

for yellow or orange and gold, with oxide of tin for magenta or pink.—Eng Pat No 22,228, 1907—"B J," Nov 13, 1908, p 873.

Szczepanik Imbibition Process—Jan Szczepanik has patented methods of preparing the mosaic colour filter which are based on the behaviour of acid basic dyes towards vehicles such as gelatine, collodion, etc Three lots of fine gelatine particles, each stained with a suitable dye, that is one having a stronger affinity for collodion than for gelatine, are mixed together and applied to a tacky collodionised substratum The dyes migrate into the collodion surface, leaving the powder colourless Where coloured particles overlie each other, uncoloured patches may be formed in the substratum, but this defect may be remedied by, say, applying only two lots of particles and afterwards producing the third colour by treating the support in a bath containing the third dye dissolved in a substance such as gelatine from which the dye will pass into the collodion

A number of variations of this method are described The substratum may be sprayed with coloured liquids containing gelatine, or a portion of the plate may receive an impression (pattern) in colourless gelatine, and a second impression given in a varnish colour The whole plate may be then immersed in a mixture of dyes (*e g* methylene blue and erythrosine which will not affect the varnish impression, but will stain the gelatine red and the collodion blue

Another method is to stain a set of three filaments with three colours and form from them a tissue or fabric—Eng Pat. No 17,005, 1908, "B J," Nov 13, 1908 p 874

Szczepanik Hollborn "Veracolor" Screen Plate—Dr F Limmer has contributed notes dealing with the share taken by Dr K Hollborn, of Leipsic, in working out the Szczepanik process of preparing a screen-plate by applying dyed particles of gelatine to a collodion surface, the dyes transferring themselves from the gelatine to the collodion It was found easier to obtain a fine powder when using gum in place of gelatine It was also found that the condition of such transference is the presence of a slight proportion of the substance in which the dyes are soluble A mixture of gelatine and cane sugar was found to serve very well in conjunction with dyes soluble in water and alcohol Afterwards milk sugar alone was used, and it was found well to add a substance to the collodion which prevented it drying too quickly Two of the dyes are applied by transference, and a third by a bath of colour—"B J" (Colour Supplement), July 2, 1909, p 49

New Warner-Powrie Screen-Plate—Dr W Scheffer has described a new type of screen plate prepared (spring of 1909) by the promoters of the Warner-Powrie process The plate is of geometrical pattern, consisting of red and blue areas and crossing green lines, its fineness of structure is almost that of the Autochrome and the separate elements show very uniform colouring throughout each unit area—"B J" (Colour Supplement), June 4, 1909, p 43

Colouring Celluloid for Mosaic Screen-Plates.—F. Lehner employs dyes soluble in water, but not in spirit, by rolling or kneading the celluloid with spirit containing as much water as possible, and adding the colours solid or in solution. The water thus serves as a carrier of the colours, which, but for its use, are insoluble in the celluloid. The dyed mass of celluloid, when rendered homogeneous, is partly deprived of its water by heating after the last addition of colour, and is then formed into films. The last portions of water are removed by drying the films for several days. The hardness of the films, caused by protracted drying, is remedied by exposure to vapours of strong spirit or absolute alcohol. Dyes soluble in water, though difficultly soluble in spirit, are stated to be as follows:—For red, Ponceau F R (Casella and Co., Frankfort-on-Main), or Ponceau 4R (Hoechst). For blue, "silk blue" (Seidenblau R of Casella and Co.) or "cotton light blue" (Baumwolllichtblau, Hoechst). For green, concentrated acid green (Säuregrün conzentriert D, Hoechst) or Naphthol green (Naphthol grün B, Casella). For yellow Naphthol yellow (Naphtholgelb S Badische Anilin u. Sodafabrik, Ludwigshafen), or "Acid yellow" (Echtgelb G, of the same firm).—Eng. Pat. No. 7,629, 1908, "B. J.," Jan. 16, 1909, p. 49.

Shellac Grain Screen Plate.—J. Herman proposes to manufacture a mosaic colour screen plate composed of particles of shellac suitably dyed. He prepares the dyed solutions of shellac in spirit, and then forms an emulsion of the shellac in turpentine either by the simple addition of the shellac solution to turpentine or with an emulsifying machine. The shellac particles are obtained of larger or smaller size by allowing different times for subsidence, and the emulsions thus prepared are applied either separately or in admixture to a plate coated with a thin layer of shellac, to which the shellac particles in the emulsion attach themselves and are caused to adhere by heat or pressure.—Eng. Pat. No. 20,971, 1908, "B. J.," Apr. 2, 1909, p. 260.

Mosaic Grain Screen Plate.—C. L. A. Brasseur has patented the following process of making a grain filter screen, the colour elements in which are flat on both sides, are thin, and touch each other:—Particles of dyed celluloid or other plastic transparent material are cut from a sheet into pieces about 1/500th to 1/1,000th of an inch square, and are rolled between discs to render them roughly spherical, when they are sifted (to grade them as to size) and again rolled. They are applied to a celluloid support by a transfer method—that is, they are first applied to paper coated with an adhesive which loses its stickiness when completely dry (e.g., gum). When the paper has been covered with the mixture of tiny spherical particles, it is rendered adhesive by moisture, the grains thereby fixed, and the excess brushed off. This coating is then applied to the celluloid sheet, and the two brought into contact under heat and pressure, when the particles adhere together, flatten out, and are fixed to the film support. In this way, it is claimed,

the particles do not run together and become irregular in shape, as is the case when applied direct by pressure and heat to the celluloid Means are described for filling up any interstices left in the coating of coloured particles —Eng Pat No 18,750, 1908, "B J," Feb 19, 1909, p 145

Celluloid Mosaic Screen-Plates.—The Vereinigte Kunstseidefabriken A G have patented the following method of preparing a three-colour mosaic filter-screen from an engraved or etched metal matrix —The process consists in forming a pattern in relief on the celluloid sheet by hot pressure against the etched plate, the depressions in which form the portions raised above the celluloid surface The latter is then inked like a printing plate with greasy ink or varnish, which is thus applied to the raised lines or bands The whole sheet is then treated in an alcoholic bath of dye whereby the depressed portions absorb colour, and the greasy ink then removed The sheet is then placed across the etched plate at right-angles to its former direction, and a second hot pressure given, the raised lines again inked, and a second application of alcoholic colouring solution, such as malachite green, carried out A two-colour screen is thus obtained with lines crossing each other at right angles The raised portions left uncovered at this stage are given a coating of dye by any suitable method, such as sensitising with bichromated gelatine solution, exposure to light and dyeing in an aqueous dye solution The process is completed by hot pressure of the whole sheet between flat plates in order to get rid of the relief Eng Pat No 21,730, 1908, "B J, Feb 19, 1909, p 146

The Vereinigte Kunstseidefabriken A G has also patented a process of preparing a mosaic multicolour screen-plate of any pattern, regular or irregular, the essential part of the invention being that no resist or protecting medium is used in order to obtain the distribution of the colour elements The distribution of the dyes is obtained by a method whereby one set of dyed portions (after being dried, and when the whole plate has been immersed in a second different dye solution) does not absorb this second colour, provided that the latter's time of action is short Nevertheless even with this short dyeing with the second colour sufficient intensity of this latter may be obtained Dyes which are named as suitable for the process are crystal violet for the first dyeing, malachite green used for about three seconds, and rhodamine G used for about one second The dye solutions above mentioned are used in equal alcoholic saturated solution —Eng Pat No 21,840, 1908, "B J," May 28, 1909, p 426

Sprayed Resist Screen Plate.—G S Whitfield has patented a method of preparing a multicolour mosaic screen plate of irregular grain, which consists essentially in spraying on to a plate (which has been stained with a suitable dye) a solution serving to protect the surface of the plate from the action of a solvent, and thus allowing of the dye being washed out from all parts of the plate except those underneath the resist which is thus sprayed on The

process consists in first dyeing a collodion film (mounted upon glass or celluloid) uniformly all over. The collodion film is then sprayed with a solution of rubber or gutta-percha or wax dissolved in, say, napththa. A series of tiny spots is thus formed over the dyed surface. On washing or bleaching the surface the dye is removed, except under those spots. The whole plate is now dyed a second colour, a second series of spots sprayed on, and the plate again washed out. A third dyeing of the whole plate is now done, and the area of the plate is thus completely filled with colour elements. The two applications of resist spots may be removed with a suitable solvent which does not disturb the three dyes.—Eng. Pat. No. 9,044, 1908; "B. J.," May 28, 1909, p. 425.

Zone-Pattern Colour Screen-Plate.—H. W. H. Palmer has patented a pattern of screen-plate in which the colour elements are distributed in concentric circular bands, the method of preparation being by impression from a die or other known means.—Eng. Pat. No. 17,309, 1908; "B. J.," Sept. 3, 1909, p. 689.

Screen Plate with Compensating Filter.—J. Bamber has patented the use of a coloured substratum, serving as a compensating filter when making exposures. The three colours are applied to this coloured basis by dusting-on or other method.—Eng. Pat. 11,147, 1909; "B. J.," Sept. 17, 1909, p. 730.

SCREEN-PLATES ON THE MARKET

The Lumière Autochrome

Simplified Treatment of Autochrome Plates.—The Lumière N. A. Company, for plates issued subsequent to Apr. 1, 1909, give the following instructions, which involve the use of two baths only, namely:—

1. Developer, also Re-developer

Distilled water	35 ozs.	1000 c.c.s.
Quinomet	60 grs.	4 gms.
Soda sulphite, anhydrous	270 grs.	18 gms.
Ammonia 0.920 (22 deg. Baumé)	100 mins.	6 c.c.s.
Potass. bromide	15 grs.	1 gm.

2. Reversal

Water	80 ozs.	1000 c.c.s.
Potass. permanganate	70 grs.	2 gms.
Sulphuric acid	6½ drms.	10 c.c.s.

For the first development the solution No. 1, as given above, is used for 2½ mins. at 65° F. in cases of correct exposure. Bath No. 2 is the reversing solution, which is allowed to act for three or four minutes, the plate washed for about half a minute in running water, and then put back into the same batch of developing solution. After three or four minutes, when the high-lights are completely darkened, the plate is washed for three or four minutes,

and, without fixing, set to dry If after re-development the plate is seen to lack brilliance (due to over-exposure), it may be intensified with the acid-silver formula previously recommended by MM Lumière --"B J" (Colour Supplement) Apr 2, 1909, p 26

Correcting Exposure in Development —MM Lumière have given the following directions for correcting errors of exposure when using a one solution developer This latter is —

Metoquinone	15 gms	130 grs
Sodium sulphite	100 gms	2 ozs
Ammonia (sp gr 0 923)	32 c c s	4½ drs
Potass bromide	6 gms	54 grs
Water	1000 c c s	20 ozs

For a half plate 5 c c s of this stock solution are mixed with 100 c c s of water, and at 60° F placed in the developing dish Measures containing 15 and 45 c c s of the stock solution are placed at hand The plate is immersed in solution A, and a number of seconds counted until the first outlines of the picture other than the sky appear The total time of development is then fixed in accordance with the following table -

Time of Appearance of First Outlines of Image Apart from Sky Secs	Quantity of Developer to Add on Appearance of First Outlines C c s	Total Time of Development Inclusive of that of First Appearance Min Secs
12 to 14	15	1 15
15 to 17	15	1 45
18 to 21	15	2 15
22 to 27	15	3 0
28 to 33	15	3 30
34 to 39	15	4 30
44 to 47*	45	3 0
more than 47*	45	4 6

Great under-exposure

—"B J" (Colour Supplement), Sept 3, 1909 p 67

Autochrome Practice —F Martin-Duncan, in recording the result of the year's work in the Autochrome process, states that he finds it best to use the Lumière modified first development, reversing with a freshly mixed mixture of acid and permanganate, afterwards placing the plate direct in a bath of sodium bisulphite solution 30 minims, water 2 ozs The plate is then thoroughly washed, re developed with amidol, and again well washed It is then placed in an F solution made twice the strength of that given in the original Lumière instructions It is always well to intensify, and necessary to have the F solution quite fresh —that is, free from brown colour or floculent matter If the plate looks at all dense or heavy, a weak Howard Farmer reducer will benefit it — "B J" (Colour Supplement), Apr 2, 1909, p 25

Autochromes of Extreme Contrast --Dr Drake Brockman has used with success the Sterry method of giving the plate a preliminary bath of 1 per cent bichromate solution (applied before the first

development) for about thirty seconds to two minutes when dealing with subjects of very violent contrasts The solution also allows of the Autochrome plate being developed in an orange light once the bichromate solution has been applied.—"B J" (Colour Supplement), Oct 1, 1909, p 73

Extra Sensitiveness in the Autochrome Plate.—J Thovert has advised the use of extra dye baths for Autochrome plates For exposure by daylight a bath of pinachrome, 1 200,000 is used for two minutes, and the plates rinsed in clean water for one minute A suitable compensating filter for these extra-sensitive plates is made as follows —A stock solution is prepared of 1 gm Filter Yellow K (Hoechst) in 150 c c s of water 1 c c of this solution is added to 9 c c s of 4 per cent gelatine solution, and the mixture flowed over the glass plate in the proportion of 5 c c s per square decimetre

For exposures by magnesium flashlight a suitable sensitising bath is erythrosin, 1 1 000,000, used for two minutes, and the plates briefly rinsed In making the compensating filter a 1 per cent solution of Filter Yellow K is prepared, and 1 c c added to 20 c c s of 4 per cent gelatine the mixture being flowed over glass in the same proportion as before, namely, 5 c c s per square decimetre This formula for the light-filter applies only to the Lumière flash-powder Other powders require a different filter, for example the 'Agfa' powder requires one of green absorption

Owing to the thinness of the film the bathed plates dry very quickly without heat The bath is mopped off the back of the plate with a tuft of cotton wool.—"Phot Couleurs," May, 1909, p 95, "B J" (Colour Supplement), July 2, 1909, p 53

A Dry Reversing Mixture.—The Comte de Dalmas in recommending a dry mixture for the preparation of the Autochrome reversing solution for use on tour, gives the formula —

Potass permanganate	2 gms	18 gr
Sodium bisulphate	50 gms	1 oz
Water	1000 c c s	20 oz

The two salts are carried separately in powder and rapidly dissolved to give the reversing bath, the acidity of which is provided by the acid sulphate.—"Bull Soc Fr Phot," Mar 1, 1909, p 102, "B J" (Colour Supplement), May 7, 1909 p 40

Pyro Solution to Keep.—T K Grant in a demonstration before the Croydon Camera Club, gave a formula for the F pyro solution used in intensifying Autochromes which prevented the fungoid growth which sometimes occurs —

Pyro	3 gms	27 grs
Citric acid	3 gms	27 grs
Salicylic acid (½ per cent solution)	100 c c s	2 ozs
Water	900 c c s	18 oz

As a remedy for the small black spots which occurred at times in the Autochrome plate he used a fairly strong solution of iodine in potass iodide, made by dissolving 15 grains each of potass iodide and iodine in 2 ozs of water This liquid is applied cautiously, followed by immersion in the hypo bath —" B J," Nov 20, 1908, p 896, and " Colour Photography " Supplement, Dec 4, 1908, p 96

Sulphide Toning for Autochromes —A Dumiy, writing of the sulphide method advised by M Torchon (" B J A ," 1909, p 656) complains of weak images To intensify he uses —

Mercuric iodide	5 gms	7 grs
Sodium sulphite (anhydrous)	1 gm	15 grs
Water	15 c c s	½ oz

On stirring up the two solids in the water a colourless solution is obtained Addition is then made of 50 c c s of water The plate is immersed in this solution, which is allowed to act until the result is thought to be satisfactory, after which the plate is washed, put back for a moment into the sulphide bath, and lastly given a further short wash —" Phot Couleurs," Dec 1908, p 301, " B J " (Colour Supplement), Jan 1, 1909, p 5

Another worker, R Ceillier, refers to the reddish stain or colour produced by sulphide toning as directed by M Torchon He traces the cause to manganese compounds left in the film To remove this, a bisulphite bath is not sufficient unless preceded and followed by thorough washing The sulphide bath should be only 1 per cent solution of ammonium sulphide —" Phot Revue Dec 6, 1908 p 177

Reducer for Autochromes —When reducing J Lowy advises the addition of about one sixth of its bulk of methylated spirit to the Farmer reducer, penetration into the film being prevented —" Phot Korr ," Mar and Apr , 1909, pp 121 and 159

Re developing Autochromes which have Practically Disappeared in the Fixing Bath —G Muller recommends the Neuhauss physical intensifier —

Ammonium sulphocyanide	24 gms	5 ozs
Silver nitrate	4 gms	360 gr
Sodium sulphite	24 gms	5 ozs
Hypo	5 gms	1 oz
Potass bromide 10 per cent solution	6 drops	34 dro
Water	100 c c	20 oz

For use 6 c c s of this solution are diluted with distilled water to 60 c c s and 2 c c s of rodinal added, that is to say, one part of the solution is diluted with 9 parts of distilled water and the rodinal added to the amount of 1 30th of the bulk of the mixture —" Phot Rund," Heft 8, 1909, p 96, " B J " (Colour Suplement), May 7, 1909, p 40

Autochrome Lantern Slides.—Ernest Marriage considers that in nine cases out of ten Autochromes intended for lantern slides should not be intensified. A brilliant three-foot picture should be obtainable with a blow-through jet, but if the slide is intensified it frequently becomes too opaque to fulfil this condition. In order to compensate for the deficiency of limelight in blue rays, it is useful to use a very pale blue screen in the lantern or to project the slides upon a screen painted pale blue with one of the distempers sold as "sky-blue" or light-blue."—"A. P.," Dec. 15, 1908, p. 565.

Autochrome Safe-Lights.—A. Lowy uses the following safe-light in developing Autochromes by inspection. A glass plate 10 × 8 inches in size is flowed over with the following solution:—

Neubordeau R, 3 : 100	5 c.c.s.
Tartrazine, 4 : 100	6 c.c.s.
Lichtgrun S, 5 : 100 [1]	7 c.c.s.
Glycerine	2 c.c.s.
Gelatine solution, 1 : 10	20 c.c.s.

After the coating has set, the plate is put to dry as quickly as possible in a moderately warmed, well-aired room, bound with a glass cover to protect it from damp, using a linen or rubber binding for this purpose. The stock solution of the Neubordeau dye keeps only a few days, that of the other colours will keep for a longer time.

For a filter which is to be used for daylight, a screen is made exactly as directed above, but is bound up when finished with a second screen prepared as follows:—

Gelatine solution, 5 : 100	20 c.c.s.
Aesculine solution	20 c.c.s.

Aesculine (0.4 gm.) is dissolved in the 20 c.c.s. of water, with addition of 3 to 4 drops of ammonia. This solution should be prepared at the time of making the filter.—"Phot. Korr.," Mar. and Apr., 1909, pp. 121 and 159; "B. J." (Colour Supplement), May 7, 1909, p. 37.

Viewing Frame.—B. J. Falk has patented a frame for the viewing of Autochrome and other transparencies in which the Autochrome is placed upside down in a frame exposed to light, and its reflection in a mirror then examined by the observer. Eng. Pat. No. 11,354, 1908.—"B. J.," Apr. 30, 1909, p. 348.

[A similar type of frame is that introduced during 1908 by Messrs. Houghtons, Limited, and described and illustrated in "B. J. A.," 1909, p. 753.—Ed.]

Dimensions of the Autochrome Film.—E. Senior has cut sections of the film of the Autochrome plate by embedding the latter in paraffin, and mounting the sections in balsam for examination

1 All three dyes in the above formula are those of the Badische Anilin und Soda Fabrik, Ludwigshafen a/Rh.

This method gave him the following figures from a number carefully ascertained by various methods :—

Thickness of the combined films, 0 09 to 0 10 mm (about 1-250 in)	
Thickness of the layer of varnish fixing the starch grains to the glass	= 0 05 mm
Thickness of the layer of starch itself	= 0 02 mm
Thickness of the varnish separating the starch from the emulsion	= 0 01 mm
Thickness of the emulsion itself	= 0 02 mm
Total	0 10 mm

The emulsion appears to be a gelatine one of rather a fine grain, the particles measuring about 0 0014 mm in diameter —"Phot ," June 8, 1909, p 464

Permanency of Autochromes —Tests made by J Lowy, of the Autochrome showed that after exposure equivalent to seven days' complete sunshine only slight reduction of intensity took place, the plate becoming a little redder A transparency kept for six months in a well-lighted room showed no difference between one part exposed and the other covered with black paper

Heat tests of the Autochrome showed that repeated heating to a temperature of 160° F, if of short duration (one minute) will do no harm Longer exposure causes darkening of the image The 5 per cent glycerine bath, recommended by Hubl, as a preventive of cracking of the Autochrome film on exposure to heat, was found by Herr Lowy to be effective even when plates were heated for one hour to a temperature of 212°—"Phot Korr," Mar and Apr , 1909, pp 121 and 159, "B J" (Colour Supplement), May 7, 1909, p 37

The Autochrome Light Filter —An editorial note records that the light-filter employed for the Autochrome plates was found to have become perceptibly paler in colour owing to having been left about in the light for a year or more, the results obtained with this filter having a bluish-violet tinge over them —"Phot ," July 6, 1909, p 9

Compensation Filters for Autochrome Plates —Baron von Hubl, in giving the following formulæ for making these light-filters, points out that it is necessary to check their correctness by photographing a grey scale If the scale comes out too blue or yellowish, the proportion of the yellow dye must be raised or reduced whilst if the reproduction is reddish or greyish the red constituent of the filter should be corrected As, however, both of these defects are liable to occur at once, the correct adjustment of such filters is frequently a task of considerable difficulty and calls for the expenditure of a good deal of time and a number of Autochrome plates

Von Hubl gives the following formula for making a light-filter corresponding in its action with that made by MM Lumière

A	Tartrazine, pure (Hoechst)	1 gm
	Water	500 c cs
B -	Phenosaffranine, pure (Hoechst)	0.1 gm
	Water	700 c cs
C	Gelatine	6 gms
	Water	90 c cs

40 c c s of the gelatine solution are mixed with 10 c c s each of A and B Immediately before use 0.4 gm of æsculin, dissolved in 20 c c s of water, with addition of 3 drops of ammonia, is added to the C solution of gelatine

The ammonia solution of æsculin speedily becomes brown, owing to oxidation by the air, and, therefore, should be freshly mixed at each time of use, in order to avoid disturbing the action of the filter Thin pieces of parallel plate-glass of about 1 mm thickness are coated with the above mixture, using 8 c c s of solution per square decimetre surface The making of a correct filter requires very careful preparation of the gelatine dye solution and exact measurements of the liquid coated on the glass 1 c c per square decimetre, more or less, has a distinct influence on the reproduction of a neutral

the proportion of gelatine dye solution be reduced to 7 c c s per square decimetre, the shadows will become distinctly blue

By using 13 instead of 10 c c s of the B solution, the results are of a warmer tint

When photographing whitish tones against very dark colours a more intense filter (9 c c s of the coloured gelatine solution per square decimetre) gives an improved result

FILTER FOR USE WITH ARC LIGHT

When working by arc light there should be less red dye in the filter A suitable formula is

Gelatine solution, 1 : 15	40 c c s
Tartrazine solution, 1 : 500	4 c c s
Saffranine solution, 1 : 7,000	1 c c
Æsculin, dissolved in 35 c c s water, with addition of 3 drops ammonia	0.4 gm

8 c c s of this solution are used for each square decimetre surface This filter used in photographing a grey scale illuminated by a 25-ampere arc lamp gives a neutral reproduction It must be remarked, however, that the colour of the light is dependent to a considerable extent on the state of the carbons and on the size and mounting of the lamp, also on the voltage, and thus a filter which can be relied upon to give constant compensation when making Autochrome exposures by arc light cannot be made

FILTER FOR USE WITH NERNST LIGHT

When using the Nernst or incandescent gaslight a pale greenish-yellow filter is needed, and is best prepared by combining a yellow

screen with one of pale blue. The screens being weak in colour, it is best to make a 1 : 2,500 solution of tartrazine by mixing 10 c.c.s of the 1 : 500 solution with 40 c.c.s of water. The filter for the Nernst light is —

Yellow Screen. —

Gelatine solution, 1 : 15	40 c.c.s
Tartrazine solution, 1 : 2,500	3 c.c.s
Æsculin, dissolved in 37 c.c.s of water, with addition of 3 drops ammonia	0.1 gm

8 c.c.s of this solution are used per square decimetre surface. This forms a yellow screen. A blue screen is made as follows: —

Blue Screen.

Gelatine solution, 1 : 15	40 c.c.s
Patent blue solution, 1 : 1,000 (Hoechst)	2 c.c.s
Water	58 c.c.s

[illegible] c.c.s of this solution are used for each square decimetre of glass. The two screens are bound together as described below.

FILTER FOR INCANDESCENT GASLIGHT.

The yellow screen is that given above for the Nernst light. The blue screen is a little paler, the above "patent blue" gelatine solution is used to the amount of 5 c.c.s per square decimetre. These yellow and blue screens are cut to the size required when dry, are cemented with Canada balsam, and bound with lantern binding. It is also necessary in the case of the Nernst and incandescent light to bear in mind that the colour is liable to vary as the lamps are kept in use. Used lamps emit a decidedly reddish light, and require filters differing from those which are correct for filaments or mantles freshly taken into use.—"Phot. Rund.," Heft 1, p. 1, Heft 2, p. 17, 1909; "B. J." (Colour Supplement), Feb. 5, p. 14, and Mar. 5, p. 17, 1909.

Viewing Filters for Autochromes.—Baron von Hubl has given formulæ for the making of compensating filters to be used when viewing Autochromes by various artificial lights or when using arc light for the projection. A flat glass plate is coated with a dyed gelatine solution, the stock solutions required being (a) gelatine solution, 1 in 15; (b) patent blue solution, 1 in 1,000; (c) rose Bengal, 1 in 100.

(1) Viewing filter for petroleum or gas light and electric light: 40 c.c. of (a), 5 c.c. of (b), 3 c.c. of (c), 30 c.c. of water.

(2) For incandescent gaslight: 40 c.c. of (a), 3 c.c. of (b), 5 c.c. of (c), 30 c.c. of water.

(3) For electric arc light: 40 c.c. of (a), 4 c.c. of (b), 4 c.c. of (c), 30 c.c. of water. In every case coat 5 to 6 c.c. of dyed gelatine solution per square decimetre.

When projecting Autochrome pictures it is advisable to use a filter which has been dyed with solution No. 3, but which is even a little lighter. The colours will thereby be more correctly reproduced; they lose the reddish tinge; green-blue and yellow are

better separated, and the loss of light is not too apparent It is also noteworthy that the delicate yellow tones are not destroyed by the use of the blue filter, but on the contrary appear much more distinct The yellows disappear into the white ground with yellow illumination, but if this light is made white by the blue filter the yellow is better recognisable It is not advisable to coat the slides with the blue film, as they easily produce a bluish tinge, which is not the case when the blue filter is placed before or behind the condenser If we chance to look at the illuminated screen (upon which the slides are being projected), say perhaps when the pictures are being changed, it looks as if it were illuminated with white light, and the slide which follows appears bluish in the colourless parts, although, as a matter of fact, this is white and the sheet was yellowish before This is not the case if the light of the lamp remains corrected by the blue filter, because then its yellow light cannot lead us astray

In the place of the filter a bluish projecting screen could be used, but the loss of light would be the same, as it is a matter of indifference whether the superfluous red and green rays are absorbed in the lantern or by a pigment on the screen

Blue filter No 3 should be used if it is desired to prepare by electric arc light the colour sensation negatives for three-colour reproduction of an Autochrome because the reddish lighting lends the whole picture a general tinge which would be evident in the reproduction If, however, a blue screen is placed in front of the original it appears illuminated by white light, and the resulting three-colour negatives are then exactly the same as those obtained by daylight —"Wien Mitt," Feb, 1909, p 49, "B J" (Colour Supplement), Apr 2, 1909, p 26

Autochromes by Enclosed-Arc Light—It has been found that the colour rendering of Autochromes, illuminated by enclosed arc when using the Lumière filter, is unsatisfactory This is possibly due to the filter not absorbing all the ultra-violet rays in which these lamps are so rich A filter that will give good results, however, can be made from a solution of bichromate of potash in water This must be very dilute, from 1-15th to 1-20th of 1 per cent, according to the width of the filter cell, 1-20th per cent serving for a cell one centimetre in width—B J," Jan 29, 1909, p 86

Autochrome Portraits by Flashlight—F Monpillard gives the following formulæ for a light-filter to be used when exposing the Autochrome plate by the "Ideal" flash powder of M D'Osmond The dyes employed are quinoline-yellow, extra (made by the Badische Anilin and Soda Fabrik), Hoechst "patent-blue," and æsculine The following stock solutions are first prepared —

A	Quinoline yellow	0 5 gm
	Water, distilled	100 c c s
B	"Patent-blue," Hoechst	0 1 gm
	Water, distilled	100 c c s

In 5 to 6 c c s of warm distilled water, contained in a graduated measure of 25 c c s capacity, 0 05 gm of æsculine is dissolved, 1 3

c c s. of solution A, 0.6 c c. of solution B, and 12 to 13 c c.s of 10 per cent. gelatine solution containing glycerine in the proportion of 2 gms per 100 gms of gelatine are added, and the whole volume made up to 25 c c s This warm solution is filtered and flowed on to glass in the proportion of 5 c c s of the mixture per 100 square cm surface It is dried away from dust, and the film protected by cementing a second glass to the first with Canada balsam

Each square cm of this screen thus contains —

Quinoline-yellow	0 000013 gm
"Patent-blue," Hoechst	0 0000012 gm
Æsculine	0 0001 gm

The screen thus prepared is placed either before or behind the lens, in all cases it is best to focus with the screen in position, taking the usual precautions necessary when using the Autochrome plate

With a lens of $f/4\ 3$ aperture and a full length subject placed about 10 ft from the camera, 8 to 10 gms of the powder will suffice for an exposure The powder should be laid in a train 15 to 20 ins long, and placed behind a muslin screen, the latter being about 6 to 7 ft from the sitter A little diffused daylight in the room is an advantage, as the sitter does not then feel the shock of the brilliant flash —"Bull Soc Fr Phot," May 15, 1909, p 203, "B J" (Colour Supplement), July 2, 1909, p. 51

H D'Osmond gives some practical hints on the use of the Autochrome by the "Ideal" flashlight, using the above filter About 8 to 10 gms of powder were used about 6 ft from the subject, placing a diffusing screen of muslin about 18 ins in front of the light A lens working at $f/3\ 8$ was employed

A vigorous developer being necessary, the following solution was made up —

Metoquinone	15 gms	130 grs
Sodium sulphite, anhydrous	100 gms	2 ozs
Ammonia 22 deg (0 923)	32 c c s	4½ drs
Potass bromide	6 gms	54 grs
Water	1000 c c s	20 ozs

and diluted for use with four parts of water — "Photo-Gazette," June, 1909, p 141, "B J" (Colour Supplement), Aug 6, 1909, p 60

Photomicrography by Limelight on the Autochrome Plate —M Monpillard gives the following formula for a compensating filter to be used when using limelight as the illuminant in photo-micro work on the Autochrome plate —

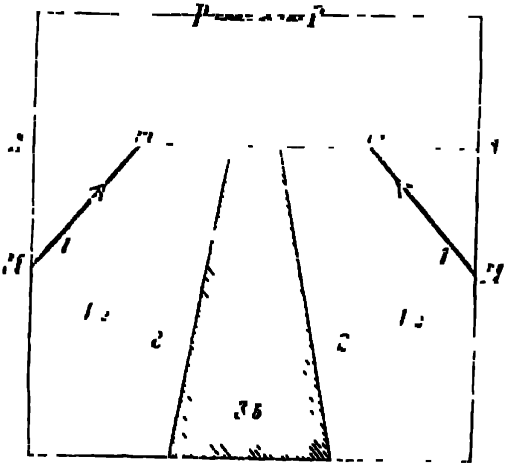
STOCK SOLUTIONS

A	Quinoline yellow	0 5 gm.	44 grs
	Water, distilled	100 c c s	20 ozs
B	Brilliant acid green 6 B	0 1 gm	1 gr
	Water, distilled	1000 c c s.	20 ozs

In 5 to 6 c c s of distilled water placed in a 25 c c bottle there is first dissolved 0 05 gm of æsculine, 0 5 c c of solution A is then

added, 1 c c of solution B, and then 12 to 13 c c s of 10 per cent gelatine solution in glycerine The volume is made up to 25 c c s with distilled water, filtered hot, and flowed upon the glasses in the proportion 5 c c s of the mixture per 100 sq cm —" Bull Soc Fr Phot," June 15, 1909, p 245, "B J" (Colour Supplement), Aug 6, 1909, p 61

Metallic Lantern-Screen for Autochrome and Other Projections.—Dr H Lehmann has described the forms of metal coated projection screens by means of which much greater brightness is obtained, although at the cost of the angle within which the picture is visible in its full brightness to the observer Since the use of a metal screen by Anderton in 1891 several forms of screen have become available A method of preparation is to apply metallic powder in the form of very thin leaves or plates to a surface coated with an adhesive preparation Still better results are obtained with an aluminium screen made by Zeiss with a peculiarly



rippled surface This gives an image which is about three and a half times brighter than that projected in the ordinary way, whilst another screen of matt aluminium also made by Zeiss gives an image of twelve times brightness In order that such screens may be used for a fair number of people they must be placed at a considerable distance from the audience, which must be arranged in a long narrow block immediately facing the screen —" Phot Chron," May 16, p 245, and May 23, p 257, 1909, "B J" (Colour Supplement), June 4, 1909, p 44

Baron von Hubl has drawn the following diagram, corresponding with the Zeiss rippled screen of three and a half times bril

liancy, showing that under ordinary conditions of lantern projection, in which P P is the screen and A A the first row of spectators, only those (20 per cent) within the hatched area will see the picture at its full brilliancy, the brightness observable on each side falls off to 2, 1½ and 1 at the outside limit *m* M —" Wien Mitt ," May, 1909, p 201 "B J " (Colour Supplement), June 4, 1909 p 47

THE "OMNICOLORE" PLATE

The "Omnicolore" Screen Plate — Dr C E K Mees, as the result of examining one of the early examples of this screen plate made by M Jougla and Co , 45 Rue de Rivoli Paris has found that the bands forming the blue lines of the screen are approximately 1 400th of an inch in width, the red squares being 1 300th of an inch across As regards transmission of light the filters differ widely from those of the Autochrome, which transmit narrow bands The red filter in the "Omnicolore" cuts off sharply at 5,800, but it transmits ultra-violet and violet light The green filter does not at all remove the red, only subduing it It has, however, a strong absorption for the blue transmitting to some extent the extreme violet The blue filter has a very gradual absorption, subduing the green and red from about 5 100 upwards The emulsion in the "Omnicolore" appears to be of gelatine and though of lower sensitiveness than that on the Autochrome or "Thames" plate, allows of shorter exposures in the camera than the Autochrome owing to the more open character of the screen The emulsion adheres perfectly to the screen without sign of frilling —"B J " (Colour Supplement), Feb 5, 1909, p 9

Dr W Scheffer as the result of photomicrographs taken of the "Omnicolore" screen has found that the method of preparing the screen is as follows —The blue coloured bands are first applied, and then, at right angles to them the green bands These latter adhere only where they come in contact with the substratum, since the blue ink repels the green The red elements are obtained by giving the plate a bath of the red dye The characteristic yellow colour under the green areas thus points to the fact that the green dye is a mixture part of the yellow in which has diffused into the substratum — "B J " (Colour Supplement), Feb 5 1909, p 11

A description and account of experiments with the "Omnicolore" plate are given by K W Wolff Czapek, in "Phot Indus ," Jan 20, 1909 p 59

Working instructions for the "Omnicolore" plate and photomicrographs of the screen as compared with the "Thames" and the Autochrome are given in "Phot " Jan 26, 1909, p 73

The solutions required for the "Omnicolore" plate are as follows —

DEVELOPER AND RE-DEVELOPER

A	Metol	4 gms	35 grs
	Sodium sulphite (anhydrous)	50 gms	1 oz
	Hydroquinone	2 gms	18 grs
	Potass carbonate (dry)	30 gms	260 grs

Potass bromide	1 gm	9 grs.
Hypo solution (1 per cent)	15 c c.s	130 minims
Water .	1000 c c s	20 ozs

REVERSING SOLUTION

Potassium or sodium bichromate	8 gms	70 grs
Sulphuric acid	12 c c s	105 minims
Distilled water	1000 c c s	20 ozs

This bath is best used in white light (daylight if possible). The dish should be rocked while the bath is acting, the silver of the negative image being completely removed in about two minutes

FIXING BATH

Hypo	120 gms	2½ ozs
Sodium metabisulphite	30 gms	260 grs
Water	1000 c c s	20 ozs

Fixing should not take longer than three to four minutes

Too little washing after reversal greatly retards the second development, and may give rise to a yellow stain in the plate It is therefore better to place the plate for about one minute in the following solution before transferring to the re developer —

Sodium bisulphite solution	50 c c s	1 oz
or Potassium metabisulphite	50 gms	1 oz
Water	1000 c c	20 ozs

The plate is washed for a second or two after the use of this bath

The following bath may be used as a means simply of clearing a plate which is slightly veiled or grey —

Bichromate solution B	12 c c s	105 minims
Distilled water	1000 c c s	20 ozs.

This is used after the plate has been washed, following the use of the re developer The plate should, of course, be well washed again before fixing —" B J " (Colour Supplement), Feb 5, 1909, p 13

It is found that the use of the acid sulphite bath immediately following reversal is a very essential part of the process, otherwise there is some difficulty in getting the plate to re-develop The violet dye in the plate appears not to be completely protected from the action of the solution, so that the colours fall off a little during re-development and fixing The latter process, however, is necessary to obtain bright colours throughout It would seem that more efficient protection of the screen-plate is needed —"B J " (Colour Supplement), June 4, 1909, p 42

THE "THAMES" PLATE

The "Thames Plate —H E Corke describes his first trials of this plate, made by the Thames Colour Plate Company, 254a, High Holborn, London, W C —" B J ," Nov 20, 1908, p 884

The formulæ given (September, 1909) for treating the plate are as follows, the same solutions being used for both the "separate'

plate and screen and the "combined" plate (i e, emulsion-coated screen-plate) :—

DEVELOPER AND RE-DEVELOPER.

A	Hydroquinone.	½ oz	25 gms.
	Potass metabisulphite	½ oz	25 gms
	Potass bromide .	60 grs	6 8 gms
	Water . . .	20 ozs	1000 c c s
B	Caustic potash	1 oz	50 gms
	Water . . .	20 ozs	1000 c c s

Use equal parts of A and B

REVERSING SOLUTION

Potass bichromate	1 oz	100 gms
Water .	10 ozs	1000 c c s
Sulphuric acid	1 dr	12 c c s

This is used repeatedly

The fixing bath consists of a 1 in 5 solution of hypo

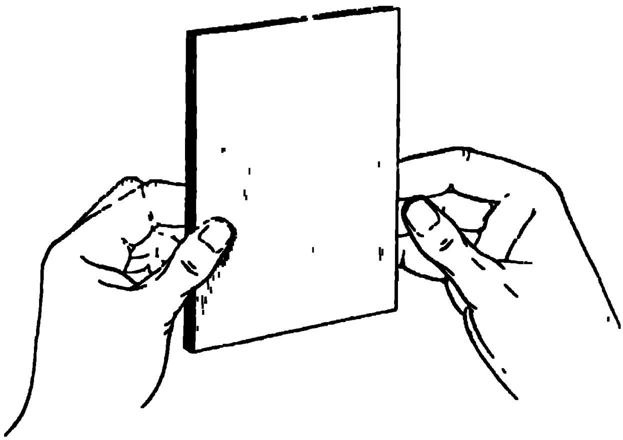
Registering the "Thames" Screen-Plate with its Positive Transparency—Colin N Bennett describes as follows the "trick" of rapidly bringing the filter screen-plate into correct register with the positive transparency First, lay the plates film to film, and shift the two one on the other, so as to eliminate all pattern effects or unevenness of colour over large areas of a like tint Never mind for the moment what colours actually show themselves so long as the pattern effect is gone

Hold them up to the light at arm's length, sitting on a chair the while (This is a precaution against over-tiredness, which affects the eyesight quicker than any other part of the body) We shall see, in the case of a Thames screen, a plaid effect in which the plaid can be made to expand or contract by slightly rotating the one glass on the other Rotate till the plaid expands right off the positive at either corner At this point one of two effects must be produced Either you will get a bar effect or there will be a more or less flat effect of colour

If it is the bar that comes, it means one has mixed up the screens and positives, and are trying to register results with screens other than those with which the monochrome was produced In the case of duplication this will, of course, be so It is got over in lantern slides by rotating the colour screen one-quarter (not half) of a turn This done, or most likely without the necessity for it at all, the plaid will be found on shifting to give place to a flat, almost colourless look If there are still slight differences, clip one end of the screen and positive with a bulldog clip, and gently press the other in the manner presently to be described until sameness of tint in the background is obtained

Now take the colour positive, in rough register with a screen as described, in both hands, and hold again directly before the eyes Let the thumbs press on the colour screen (which should be on the near side) and the fingers on the positive, which should be on the far side of the observer Remove bulldog clips and proceed as follows —In all the following part of the operation of registering no conscious slip of positive against screen is to be allowed We are about to complete registration by relying on the elasticity of the glass alone If there is a "slip" the process will have to be gone over again from the beginning

Nip firmly the two glasses with both hands At the same time turn the two together slowly at an angle with the eye, first sideways then up and down until suddenly a point of view will be reached in which, say yellow flowers and blue background will



Illustrating the *moment of* [illegible] imposing the strain on the superposed glasses *with both hands together* in process of obtaining register

appear to start out in their natural colours The effect is one of parallax, and by it we must judge which way to send the shift of screen and plate If we see the effect we want when the right edge of the tightly pressed positive and colour screen is drawn towards us it means the screen must be shifted to the left The same rule applies all round

Make the shift in the following way —Put a forward pressure on the right thumb, and at the same time a backward pressure on the left one, at the same time reproducing the two pressures in contrary motion with the fingers, and all the while nipping the two glasses so tightly together that no conscious "slip" is perceptible The effect is to strain the glasses and bring about a microscopic shift due to their elasticity It may take a dozen or

more such shifts to move their respective positions the width of one screen dot (approximately 1-1,500 inch) After each application of the shift, remove one hand at a time (see accompanying illustration), relaxing it and retaking hold of the glasses firmly This will complete the cycle upon which the movement depends, and will make all ready to repeat and repeat until the true colours show up on a square view through the adjusted transparency

Finally, clip all round with bulldog clips and bind tight with binding strips Once dry, these show no tendency to warp or pull the combination out of register —" B J " (Colour Supplement). Aug 6, 1909, p 57

"Aurora" Screen-Plate

"Aurora" Screen-Plate —This screen-plate, designed and made by E Fenske, 21, The Pavement, Thornton Heath, London, S W, is prepared by dusting coloured particles on to an adhesive support The screen thus prepared is used in conjunction with a separate panchromatic plate —" B J " (Colour Supplement), Mar 5, 1909, p 23

E Fenske states that the following process is suitable for the reversal of gelatine panchromatic plates as necessary in preparing positives on exposure through a screen plate —The negative, after bleaching in a mixture of potass ferricyanide and ammonium bromide does not re develop in hydroquinone (ordinary developing formula) Thus a plate is developed with almost any developer, bleached, and re developed as a positive with hydroquinone The plate must during bleaching be exposed to a ruby light, but on no account to white light When completely bleached, it is washed for a minute and immersed in the hydroquinone developer, being kept close to the ruby light during re development After fixing in strong hypo, any veil is removed with Farmer's reducer —" B J " (Colour Supplement), Apr 2, 1909, p 32

Colour Screen-Plates Compared —R C B (R Child Bayley), in an article on the three colour plates, the Autochrome, "Thames," and "Omnicolore," describes the "Omnicolore" as having a more transparent filter film than the Autochrome, due to the less depth of dye and to the absence of black spots or lines where, in the Autochrome, minute particles of starch overlap or where the cell walls are seen edgeways

As regards colour, the "Thames" plates had generally a blue colour, varying according to the angle at which they were held to the incident light In the case of the "Omnicolore," the screen is of a salmon tint, also varying according to the angle The Autochrome is much more nearly neutral, being a nondescript kind of olive in appearance, and in fineness of colour grain is also far before the other two plates

In sensitiveness the "Omnicolore" and the "Thames" seem to be each about twice as fast as the Autochrome

In correctness of colour rendering the Autochrome is undoubtedly the superior of the other two plates —"Phot," Jan 26, 1909, p 64

COPIES OF SCREEN-PLATE TRANSPARENCIES.

***Copying Screen-Plate Transparencies.*—An English patent (No 28,614, 1907) of Arthur Schwarz relates to the making of screen-plate duplicates by the Krayn process —"B J ," Nov 13, 1908, p 874**

Copies of Screen-Plates—E B Wedmore has found that in making contact copies, film to film, with screen-plate negatives, a process such as pinatype, involving the transfer of dye from a gelatine print plate to a gelatine-coated paper, secures sufficient continuity of tone, the diffusion of the dye produces this result unless the structure of the colour negative be very coarse

When making enlargements the use of a heavily coated paper is desirable to assist the diffusion Diffusion may be increased by heating the print whilst moist, also by retarding the drying It will be found that each grain in the colour negative is represented in the positive transparency by a spot the size of which depends upon the diameter of stop used, but the centre of which is materially darker than the surroundings By the use of a large enough stop the dark centres of adjacent spots may be made to blend, but in so doing there is some loss of definition Improved definition is obtained by the use of a diaphragm, screened so as to cut off some of the light at the centre, thus a stop having a star-shaped obstruction may be employed, or a graduated stop darkest in the centre may be prepared photographically Such means are not required except when the grain is too large to be conveniently dealt with by diffusion in printing —Eng Pat , No 21,684, 1907, "B J ," Oct 16, 1908, p 797

Paper Colour Prints from Screen-Plate Transparencies—E C G Caille proposes a process of preparing prints in natural colours as the result of making an exposure on a panchromatic plate through a mosaic three-colour screen-plate of geometrical pattern From the screen negative made in this way through a mosaic filter a transparency is made by contact A print is taken from this on a special surface prepared as follows —A rigid paper support is impressed with a three colour pattern identical with that used as a filter in taking the original negative the colour elements, however, consisting of the complementaries, namely, pink, yellow, and blue This paper support bearing the three-colour pattern is coated with sensitive gelatino-bromide emulsion It is laid in registration with the positive made from the original negative and the image developed and fixed As a result the transparent portions allow of the colours on the screen below being seen and producing the natural colours photographed in the first instance Owing, however, to the degradation caused by the black deposit of silver which is used to obstruct the colours not forming part of the picture, the author proposes to adopt the so-called "gouache" method of painting, namely, to bleach the black deposit and so obtain dilution of the colours with white instead of degradation with black In order to secure a bleached image which will not afterwards darken in

the light, the author uses a 1 to 2½ per cent of bichloride of mercury, draining or blotting off the excess without washing The excess of bichloride prevents the image from becoming brown in the light Bichloride of copper in dilute solution may be used for the same purpose, afterwards thoroughly washing and impregnating the print with a weak mercuric chloride solution to prevent after darkening --Eng Pat, No 15,050, 1908, "B J," Aug 13, 1909, p 634

The Bleach-Out Process.

Sensitisers and Desensitisers for Bleach out Dyes—Dr J H Smith has examined a number of bodies (desensitisers) which do not aid the bleaching out of dyes for "Uto" paper, but, on the other hand, reduce the speed of bleaching of one or more dyes or counteract the action of sensitisers, in both cases frequently to an enormous extent Volatile oils fall into one or other of these classes Using basic dyes contained in nitro-cellulose, the presence of a diffusing body, such as glycerine or castor oil, is necessary in order to bring out the action of the sensitisers A sensitiser, which is also a solvent of the collodion film, will exert its action, but otherwise will not accelerate the bleaching of the basic dyes. The best sensitiser is anethol

Other important sensitisers are the oils of

Cassia	Citronella	Sage
Cedar leaves	Mustard	Spike
Cedro	Peppermint	Spruce
Cinnamon	Pine	

The following oils were strong desensitisers –

Caraway oil	Oil of origanum	Clove oil

It is frequently found that small proportions of a powerful desensitiser will destroy the sensitising action of a moderate sensitiser Among chemical compounds eugenol and isoeugenol are the most energetic desensitisers, then follow carvacrol and thymol

Bodies of the aldehyde class usually yield strong sensitisers

As almost all sensitisers are volatile, it appears necessary to pack manufactured bleach-out paper in tinfoil, and also by covering the surface of the paper with a gelatine coating to imprison the sensitisers until the print has been made, the gelatine film being then stripped off before fixing and finishing the colour copies—"B J" (Colour Supplement), Nov 6, 1908, p 81

Dyes for the Bleach-out Process—Dr W Merckens in a paper appearing in the "Revue Technique et Industrielle," states that from experiments on dyes and colloid bodies it appears that dyes of acid character, or containing acid radicles in their constitution, possess an affinity for gelatine and albumen Among these are

erythrosin, diamine blue 6G, and naphthol-yellow. Dyes of a basic character more easily impregnate cellulose and its derivatives. Among these are saffranine, methylene-blue, and auramine. The simplest method of preparing a bleach-out paper is to employ three dyes of acid character in gelatine on collodionised paper, or three basic dyes in collodion on a gelatine or baryta-coated paper. The drawback to saffranine for the red colour is that it leaves a brownish residue of colour, but later experiments of the author have led to a suitable dye.—"Phot. Couleurs," Nov., 1908, p. 269, "B.J." (Colour Supplement), Jan. 1, 1909, p. 1.

Bleach-out Process.—Dr. J. H. Smith states that he has discovered a new sensitiser for bleach-out dyes giving enormously greater sensitiveness than anethol. A paper prepared with it should be double the speed of P.O.P.—"B.J." (Colour Supplement), Mar. 5, 1909, p. 23.

Chemistry of the Bleach-out Process.—Dr. K. Gephard has found that in the bleaching out of mixtures of dyes the action of sensitisers varies with:—

1. The nature of the dye to which they are added.
2. The presence of other dyes or salts.
3. The medium or substratum in which they are dissolved.
4. The relation of their concentration.

Various sugars accelerate, whilst gums retard. Albumenoid substances accelerate, whilst bodies of alkaloid or aldehyde constitution act as retarders. An important point in the bleach-out process is that, in order to ensure the fixation of the image, the decomposition product of the dye should be removed as well as the sensitiser.—"B.J." (Colour Supplement), Apr. 2, 1909, p. 32.

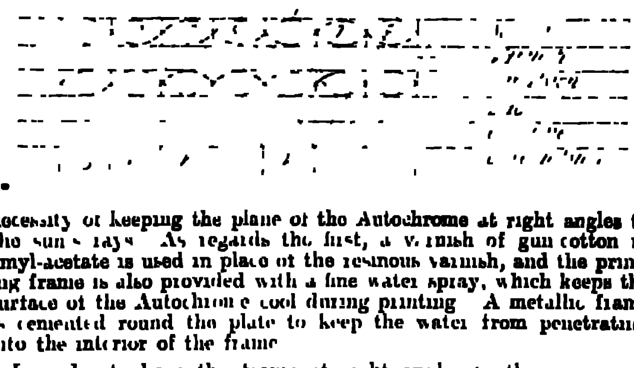
Bleach-out Colour Photographs.—According to a recent German patent (No. 209,993 of Sept. 20, 1907), taken out by Dr. H. Stobbe, of Leipsic, it has been possible to prepare a series of dyes, the so-called fulgides, which are converted most rapidly into colourless compounds on exposure to light. This change takes place with greater rapidity when the fulgides are dissolved in ether, acetone, petroleum ether, chloroform, benzole, gelatine or acetone-collodion, or when they are supported in a collodion or celloidine film on paper or other cellulose body. Addition of iodine, nitro-benzole, phenol-ethers, or ethereal oils hasten the process to such an extent that the bleaching-out action is complete in a few seconds. The fulgides can therefore be mixed with equally sensitive blue dye for the preparation of multi-colour prints by the bleach-out methods.

Printing Frame for Bleach-out Copies from Autochromes.—Dr. J. H. Smith has worked out the data necessary when using the mirror printing frame suggested by him for accelerating the printing of Autochromes on bleach-out paper, namely:—

(1) The best angle in which to place the mirrors.
(2) The correct length of the mirrors.

Taking the dimensions of the Autochrome plate (in section) as follows: thickness of filter screen, 1-100 mm., varnish, 1-100 mm.; emulsion, 1-100 mm., protective varnish, 1-100 mm., and assuming the "Uto" paper to have a gelatine coating of 1-100 mm. and, further, that the average diameter of the coloured patches is 2-100 mm., it can be shown that the mirrors placed round the Autochrome transparency should include an angle not greater than 75°, which angle, for all four mirrors, is calculated to give an increase of light of nearly 4½ times, thus greatly reducing the time of printing.

The other difficulties in the printing of Autochromes arise from the heating of the Autochrome during printing and from the



necessity of keeping the plane of the Autochrome at right angles to the sun's rays. As regards the first, a varnish of gun cotton in amyl-acetate is used in place of the resinous varnish, and the printing frame is also provided with a fine water spray, which keeps the surface of the Autochrome cool during printing. A metallic frame is cemented round the plate to keep the water from penetrating into the interior of the frame.

In order to keep the frame at right angles to the sun's rays during printing, a sheet of metal is introduced upon which the contours of the shadow of one of the mirrors when in proper position is indicated.—"B. J." (Colour Supplement), Jan. 1, 1909, p. 2.

The apparatus is patented by F. H. Smith and W. Merckens in Eng. Pat. No. 15,937, 1907.—"B. J.," Aug. 27, 1909, p. 676.

Trichromy by the Bleach-out Method.—H. Quentin suggests that makers of bleach-out papers should supply three separate papers, each giving a different colour, and prepared so that the three images could be combined by stripping.—"Phot. Couleurs," July, 1909, p. 153. "B. J." (Colour Supplement), Oct. 1, 1909, p. 78.

KEY TO THE ABBREVIATIONS OF JOURNALS QUOTED IN "EPITOME OF PROGRESS," WITH ADDRESSES OF THOSE PUBLISHED IN FOREIGN COUNTRIES —

"A. P"	"The Amateur Photographer and Photographic News"
"Amer Phot"	"American Photography" 361, Broadway, New York City, U S A
"Ann Gen Phot" ..	"Annuaire Général de la Photographie" Plon Nourritt & Co , 8, Rue Garancière, Paris
"Ann. Chem Phys"	"Annales de Chimie et de Physique" Masson et Cie , 120, Boulevard St Germain, Paris
"Apollo"	"Apollo" Albrechtstrasse 39b, Dresden A 10, Germany
"Atelier"	"Das Atelier" W Knapp, Halle a/Saale, Germany
"Aust Phot Journ	"Australian Photographic Journal" Harrington & Co Ltd , 386, George Street, Sydney, Australia
"Aust Phot Rev"	"Australian Photographic Review" Baker & Rouse Proprietary, Ltd , 375, George Street, Sydney, Australia.
"B J"	"The British Journal of Photography"
"B J A"	"The British Journal Photographic Almanac"
"Photo-Notes"	"Photo-Notes"
"Berichte" .	"Berichte der Deutschen Chemischen Gesellschaft" R Friedlander & Sohn, Karlstr 11, Berlin
"Bild" ..	"Das Bild" Neue Photographische Gesellschaft, Steglitz, Berlin
"Bull Belge"	"Bulletin de l'Association Belge de Photographie" Ch Puttemans, Palais du Midi, Brussels
"Bull Fr Chem. Soc	"Bulletin of the French Chemical Society" Masson et Cie , 120, Boulevard St Germain, Paris
"Bull Soc Fr Phot	"Bulletin de la Société Française de Photographie" Gautier Villars et Fils, Quai des Grands Augustins 55, Paris, France
"Bull Phot"	"Bulletin of Photography" 506, Washington Building, Chestnut Street, Philadelphia, U S A.
"Cam." ..	"The Camera." 506, Washington Building, Chestnut Street, Philadelphia, U S A.

"Cam Craft" .	"Camera Craft" 713/715, Call Building, San Francisco, Cal, U.S.A
"Cam Work"	"Camera Work" Alfred Stieglitz, 1111, Madison Avenue, New York, U S A
"Cent Zeit"	"Central Zeitung fur Optik und Mechanik" 7, Billowstr, Berlin, W, Germany
"Chem News"	"The Chemical News"
"Chem Zeit"	"Chemiker Zeitung" Dr G Krause, Cothen (Anhalt), Germany
"Compt Rend"	"Comptes-Rendus des Seances de l'Académie des Sciences" Gauthier Villars, 55, Quai des Grands Augustins, Paris
"D Phot Zeit"	"Deutsche Photographen-Zeitung" K Schwier, Weimar, Germany
"Der Amateur"	"Der Amateur" Mondscheingasse 6, Vienna VII, Austria.
"Der Phot"	"Der Photograph" Benno Fernbach, Bunzlau
"Eder's Jahrbuch"	"Jahrbuch fur Photographie und Reproduktionstechnik" W Knapp, Halle a/S, Germany
"Il Prog Foto"	"Il Progresso Fotografico" R Namias, 27, Via Boccaccio, Mailand, Italy
"Journ Chem Soc Trans"	"Journal of the Chemical Society Transactions"
"Journ Phot Soc Ind"	"Journal of the Photographic Society of India" 40, Chowringhee, Calcutta, India
"Journ Roy Micr Soc"	"Journal of the Royal Microscopical Society"
"Journ S C I"	"Journal of the Society of Chemical Industry"
"Journ Soc Arts"	"Journal of the Society of Arts"
"Knowledge" .	"Knowledge"
"Le Phot"	"Le Photo Journal" 22, Rue Varenna, Paris
"Mon Phot"	"Le Moniteur de la Photographie" 17, Rue des Moines, Paris, France
"N Z Phot"	"Sharland's New Zealand Photographer" Lorne Street, Auckland, N.Z
"Nature" . .	"Nature"
"Oest Phot Zeit"	"Oesterreichische Photographen Zeitung." Oesterreicher Photographen-Verein, Vienna III/I
"Opt" ..	"The Optician"
"P. M" ..	"The Photo-Miniature" 122, East Twenty-fifth Street, New York, U S A.

"Pharm Journ"	"The Pharmaceutical Journal"
"Phil. Mag"	"The Philosophical Magazine"
"Phil. Trans"	"Philosophical Transactions of the Royal Society"
"Phot" ..	"Photography and Focus"
"Phot Chron"	"Photographische Chronik" W Knapp, Halle a/Saale, Germany
"Phot Couleurs"	"La Photographie des Couleurs" 118, Rue d'Assas, Paris
"Phot Indus"	"Photographische Industrie" 6, Charlotten Strect, Berlin, Germany
"Phot. Journ."	"Journal of the Royal Photographic Society of Great Britain" ("The Photographic Journal")
"Phot Korr"	"Photographische Korrespondenz" Buchkunstrasse 12, Vienna I, Austria
"Phot Kunst"	"Photographische Kunst" Rennbahnstrasse 11, Munich, Germany
"Phot. Mitt"	"Photographische Mitteilungen" Gustav Schmidt, Konigin Augustastr 28 Berlin W 10, Germany
"Phot Monthly	"The Photographic Monthly
"Phot Rund	"Photographische Rundschau W Knapp, Halle a/S Germany
"Phot Scraps	"Photographic Scraps
"Phot Times	"The Photographic Times." 39, Union Square, New York City, U S A
"Phot Welt	"Photographische Welt" (M 1 gr 1), 28, Grimmaischer Steinweg, Leipsic Germany
"Phot Woch"	"Photographisches Wochenblatt" 13, Bendlerstr, Berlin, W.
"Photo-Era" .	"Photo Era" 383, Boylston Street Boston, Mass, U S A
"Photo Gazette"	"Le Photo Gazette" 14, Rue des Minimes, Paris, France
"Photo-Revue"	"Photo-Revue" 118, Rue d'Assas, Paris VI, France
"Photographie"	"La Photographie" 118, Rue d'Assas, Paris, France
"Phys Rev"	"The Physical Review" The Macmillan Company, 66, Fifth Avenue, New York, U S A.
"Pro and Am Phot	"The Professional and Amateur Photographer" 222, Washington Street, Buffalo, U S.A.
"Proc Roy Soc"	"Proceedings of the Royal Society"
"Procédé" .. .	"Le Procédé" 150 Boulevard de Montparnasse, Paris VI,

"Rev Trimest"	"Revue Trimestrielle des Travaux de Recherches" A Lumière et ses Fils, Lyons
"Sci Amer"	"The Scientific American" Munn & Co, 361, Broadway, New York, U S A
"Sonne"	"Sonne" Kaiser Platz, 18, Wilmersdorf, Berlin
"St L and C Phot"	"The St Louis and Canadian Photographer" 911, N Sixth Street, St Louis, Mo, U S A
"T Q"	"Telephoto Quarterly"
"Wiener F Phot Zeit"	"Wiener Freie Photographen Zeitung" Gustav Walter, Albertstrasse 71, Vienna VIII, Austria
"Wien Mitt"	"Wiener Mitteilungen" Graben 31, Vienna I, Austria
"Wilson's"	"Wilson's Photographic Magazine" 289, Fourth Avenue, New York, U S A
"Zeit. fur Instr"	"Zeitschrift fur Instrumentenkunde" Julius Springer, Berlin
"Zeit fur Repro"	"Zeitschrift fur Reproduktionstechnik" W Knapp, Halle a/Saale, Germany
"Zeit fur Wiss Phot"	"Zeitschrift fur Wissenschaftliche Photographie" J A Barth, 17, Rofsplatz, Leipsic, Germany

RECENT NOVELTIES IN APPARATUS.

By the Editor

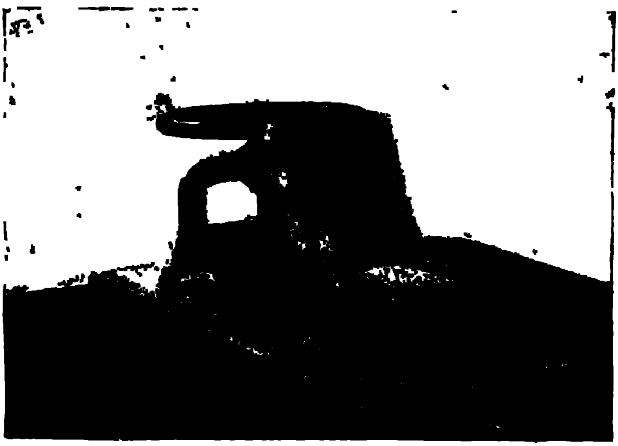
[These notices are confined to apparatus introduced since the publication of the last Almanac. In all cases the various articles have come under our personal examination, a rule from which we allow no departure.

The items in this section are indexed in the General Index to Text placed at the end of the volume.]

THE MORGAN PROCESS OF DRY MOUNTING PLATE MARKING AND DYE STAMPING AT ONE OPERATION

(Marketed by O. Sichel and Co., 52, Bunhill Row, London.)

By this process the photographic print is secured to its mount, the latter impressed with a plate mark, and also with the die impression of the photographer's name or address or other wording—



all at one single operation. This is done, firstly, by the use of a new dry mounting material or medium, which is applied to the backs of the prints as they come away from the last washing water, or may be applied to the raw paper used for

any of the usual printing processes before it is coated Papers thus ready for dry mounting are shortly to be placed on the market, but already a ready made, self-adhesive, coated transfer paper for use in the carbon process is available, the tissue being transferred direct on to this, and the special coating on the back employed in fixing the carbon print to the mount The plate marking is done by laying in register upon the mount a suitable template, or cut-out sheet of metal, which is hinged to a second plate of similar size on which the mount with the print in position is laid, and the former pushed up against the stop upon the plate The template being then laid over and the whole given hot pressure in a special form of press, the two operations of plate-marking and mounting are done together whilst for the die marking a suitable die is made to form part of the template Great depth in the way of embossing or plate marking is obtainable by this method, which, besides saving time, allows the photographer a very great latitude in the selection of his mounting materials, permits him to indulge his own tastes up to a large degree, and further reduces the manipulation to a degree of simplicity, such that it may be carried out by assistants of very little skill The press it should be understood, may be used equally well for these three purposes separately—that is to say, it may be used by the photographer to die stamp his mounts or to plate mark or emboss his mounting papers

The photograph shows the template opened with the mount in position A booklet describing the process and the materials supplied for working it may be obtained from Messrs Sichel

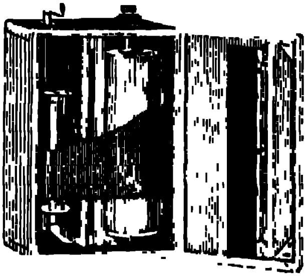
THE "CIRKUT" PANORAMIC CAMERAS

(Made by Kodak, Limited, 57 to 61, Clerkenwell Road, London, E C)

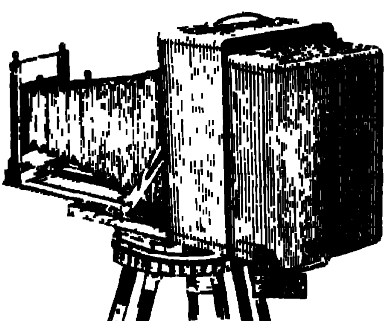
Under this name the Kodak Co have introduced a quite new type of panoramic camera, designed, it need hardly be said, for roll film, and serving for the widest range of panoramic photography The "Cirkut" has not been designed for, nor is it offered to, the amateur photographer who would take panoramic pictures as a form of entertainment The apparatus is intended for the most exacting descriptions of expert and commercial photography, and it is not too much to say that from this point of view it is an instrument which occupies a place by itself among photographic equipments It supplies the means of producing photographs for which there has been in the past a very considerable demand among certain classes of customers, such as railway companies, municipal authorities, estate agents and others desiring to present a complete and attractive photograph of a scene which cannot otherwise be shown in a single photograph While hitherto the photographers who have been called upon to do this class of work have had to resort to tedious methods involving the use of a number of glass negatives and processes of combination printing to secure a single photograph, the use of the "Cirkut" camera makes the production of a photo-

graph—even of one including the whole horizon of 360 deg.—as easy a matter as the taking of a single negative with a stand camera.

For in the "Cirkut" a special tripod is provided, round the circumference of which a metal rack is fitted and guides the rotary course of the camera. The camera itself on the "Cirkut" attachment, which is also sold for use with the Kodak "Century" camera,



is provided with clockwork motive power, the pinion gearing with the rack on the tripod head. Two brakes are provided, so that the speed of rotation can be modified. The camera, therefore, as soon as affixed to the tripod head, is pointed to the subject, and the rotation of the instrument started by pressure on a release. The mechanism of the instrument shows the length of film which is being



used for the exposure, and further perforates the film on the completion of exposure, so that the operator when removing it from the apparatus knows exactly which portion to develop.

The exposure which each narrow section of film receives as it moves in relation to the lens is about 1-10th sec., a fact which may suggest to some that in the case of street scenes and other subjects

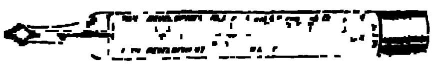
where there are rapidly moving objects this speed will be quite inadequate to secure freedom from blur. It should therefore be pointed out that from the circumstances of the case the "Cirkut" camera has to be placed at a considerable distance from the subject being photographed, and on that account the effect of moving objects is of less importance. When we say that the large panoramic photographs taken with the "Cirkut" of such scenes of incessant traffic as Piccadilly Circus and the Place de l'Opera are practically free from any blurring due to the movements of vehicles, it will be understood that the scope of the "Cirkut" camera is not restricted on this account. The two illustrations represent first the roll-holder of the camera, whilst the second shows the "Cirkut" attachment to one of the Kodak Company's "Century" cameras. In addition to the apparatus for making the negatives the company also supply long box printing frames taking film up to 10ft. in length for taking off the prints.

For all those engaged in photography for advertising and commercial illustration the apparatus is certainly one which may be expected to pay for itself within a short time, since the results obtained with it are not to be compared with those secured either by a wide angle lens or by the tedious processes of double printing.

THE WATKINS TIME THERMOMETER

(Sold by the Watkins Meter Company, Hereford.)

Still another of the many pieces of equipment with which Mr. Watkins has provided the photographer is now introduced in the shape of this thermometer, which is unlike any instrument of the kind, inasmuch as the scales with which it is provided are not marked with temperatures, but with times of development for certain developers and certain speeds of plate. Development being more rapid the warmer the developer, it therefore follows that the scale is a descending one, and this fact should not be disregarded, otherwise a mistake may easily be made in reading the thermometer. For example, if the mercury stands half a division above 15, the reading is not 15½, but 14½. Thus the thermometer represents a



variation of the system of providing for differences in temperature in time development, the modified method being to develop for the time corresponding to a certain temperature and to make allowance for the differences among plates as regards speed of development by modifying the composition of the developer, that is, by using it at greater or less dilution. The thermometer itself contains a table giving the dilutions which must be taken for plates of the seven different classes and for four separate developers. These are the Watkins one-solution (time) developer, a pyro soda and metol hydroquinone developer (of which the formulæ are given), and, lastly, the one solution commercial developer such as Rodinol, Azol, Certinal,

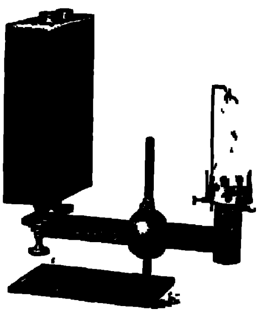
and Vital M[illegible] a separate [illegible] on the thermometer to give the correct time for the various Kodak and Premo film tanks, with their appropriate Kodak tank powders. In all cases an exposure which is practically correct must be assumed in using these methods, and on that account beginners who would make the most of the later forms of assistance which the Watkins Meter Company offer them must not neglect the use of an exposure meter nor the study of the Watkins Manual. The price of the thermometer in a wooden case is 2s. 6d.

A form of the meter for use in developing Autochrome plates is also supplied by the Watkins Meter Company at the same price.

THE PETROLITE ENLARGING LAMP

(Sold by Van Neck and Company, 32, Gray's Inn Road, London, W.C.)

A new self-contained incandescent light for the optical or enlarging lantern has been designed by A. J. Garrard. The lamp burns petrol (motor spirit), and is of such very simple construction that it is difficult to see how any mishap can occur with it. It consists of a saturater, placed, as shown in the drawing, at the back of the burner, that is to say, outside the lantern. The saturater is a metal chamber supported through its centre on a pillar of about ⅜ in. diameter, which communicates with the burner. The interior of the chamber is filled with an absorbent material, which is charged



by filling it with petrol, allowing the latter to remain for a minute or so and then drawing off the excess. The action of the apparatus is thus to provide the burner with a current of air saturated with petrol, giving a very intense incandescent light without aid of a pump and in a very small space. One very great advantage of the lamp is that by means of the screw beneath the tank the light can be turned quite low. One charge of petrol suffices for a light of six hours' duration, at a cost of about one penny. As regards safety, the saturater can be taken off its pillar and a light applied to it; the only result is to inflame the traces of vapour in the

tube These features of the lamp should, we think, strongly appeal to those enlarging by artificial light since even when gas is available, a light of this kind, which allows of the enlarging lantern being placed anywhere, is the most convenient whilst the light given by it is a very great improvement on the ordinary incandescent burner The price of the "Petrolite" lamp, complete with burner and mantle, but uncharged, is £1 10s

THE "A-KLA" DAYLIGHT-LOADING PLATE-HOLDER

(Sold by the A-kla Company, Sale, Cheshire)

Of the many systems and pieces of apparatus which have been devised for providing photographers with facilities for carrying plates ready for exposure in the camera similar to those available in the case of roll-film by the daylight-loading spool, we cannot point to one which has enjoyed more than the briefest period of approval But in the case of the "A-kla" system, which will be available by the time these lines appear in print, the worker can purchase plates to any number at the price of 1s 3d per dozen, and these may be transferred in full daylight to the "A-kla" apparatus, which is three things at the same time namely, the loading chamber and two single plate holders. Though it is impossible in any printed description to avoid the suggestion that the apparatus is complicated in use, we would say at once that the article itself is absolutely without mechanism, whilst the operation of inserting the plate in a state ready for exposure is one in which the merest tyro cannot unknowingly make a mistake The plates are supplied in pairs, placed face to face each pair in a light-tight double sheath of thin metal, the overlapping rebates of the sheaths enclosing the plates secure from light Thus packed in sheaths, the plates are issued in packets of one dozen, and as each plate is backed up by a non actinic sheet of tissue paper, cemented to the glass side with a soluble adhesive, the photographer is actually paying the normal price for a backed plate

The apparatus in which the plates are exposed consists of a pair of single dark slides, each fitted with a pull-out shutter of the ordinary pattern The two slides, however, are not alike in other respects One is provided with a full-size shutter in addition to the pull-out shutter, through which the metal sheath enclosing the two plates is inserted The other plate holder is provided with a back, in which is a square aperture, a spring placed across this aperture serving to grip one-half of the sheath and hold it securely in the plate-holder, whilst the other and outside half of the sheath is held against a rebate in plate-holder No 1 Catches attached to the two plate-holders allow of them being held face to face, making a light tight joint, so that when the two pull out shutters are withdrawn the double sheath (containing the two plates) may be placed inside The back sliding shutter is then closed, and the inner part of the sheath separated from the outer and held by the spring above described On now re inserting the two pull out shutters the apparatus can be taken apart, and gives the worker two single plate-

holders, each containing a sensitive plate ready for exposure. By reversing the order of these operations—which, as we have said, appear ridiculously lengthy in print—the sheath is put together again, and the two plates can then be removed and retained for any convenient time for developing. The price of the "A-kla" apparatus is 15s., or with the daylight developing chamber described below 25s., the developing tank itself being purchasable separately at 7s. 6d.

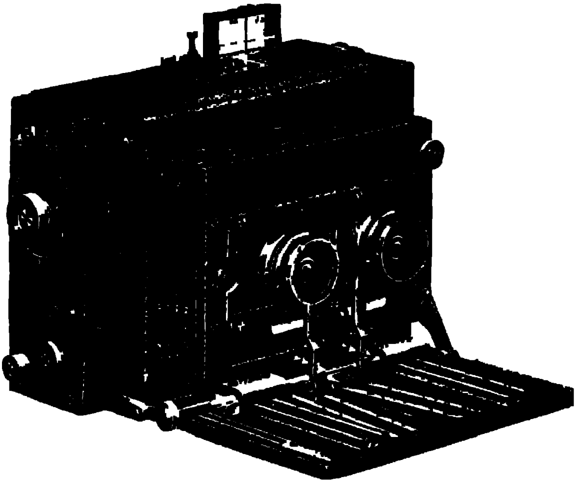
For development the "A-kla" Company supply a vulcanite tank consisting of two parts, the inner taking the double sheath, and allowing of the two parts of the latter being separated, so that the surfaces of the plate are exposed for development. The outer or tank portion of the developing apparatus allows of 6 ozs. of any developer being used to develop the plates. But the "A-kla" system provides a further novel means of controlling the development. With each pair of plates is provided a small piece of film, one half of which has been exposed to light and developed to a certain depth, whilst the other half has been left undeveloped, but has been treated so that further exposure of light is without effect upon it. This small piece of film is used as a test of the progress of development, the two plates being removed when the "developette," as it is called, has reached the standard tint. The "A-kla" apparatus may, of course, be used for development by time quite apart from the above "test patch" method, and in any case it must be made clear that the daylight changing system is applicable to ordinary methods of development in a dark-room. A complete description of this very practical and ingenious apparatus is obtainable from the "A-kla" Company.

THE ZEISS AUTOMATIC STEREOSCOPIC LENS BOARD.

(Made by Carl Zeiss, Jena, Germany, and 29, Margaret Street, London, England.)

The very ingenious device of Dr. W. Scheffer for making stereograms at short range, whereby the separation of the pair of stereoscopic lenses is automatically adjusted by the focussing portion of the camera, has now been put on the market by the firm of Carl Zeiss as a separate accessory, which is carried in a leather case measuring 4½in. by 4¼in. by 1½in. The illustration shows it fitted to the camera in place of the ordinary lens panel. Its addition is the work of only a few seconds, the camera being racked out to its greatest extension and the panel slipped into place with the points of the levers in the grooves on the camera baseboard, these grooves being sold with the accessory panel. On now racking the camera in and out when focussing, no adjustment of the distances between the lenses is necessary. The grooves themselves control this, and relieve the photographer himself from the necessity of supervising this necessary condition to the best stereoscopic work. When taking objects same size the distance between the lenses is 1 3-16ths, whilst when photographing distant objects it is 2 5-16ths. As the lenses cannot be in the sunk type of mount, owing to the necessity

for bringing them close together, it is necessary to remove the automatic panel when closing the camera, an operation which, owing to the mechanical perfection of the workmanship, is just as smooth



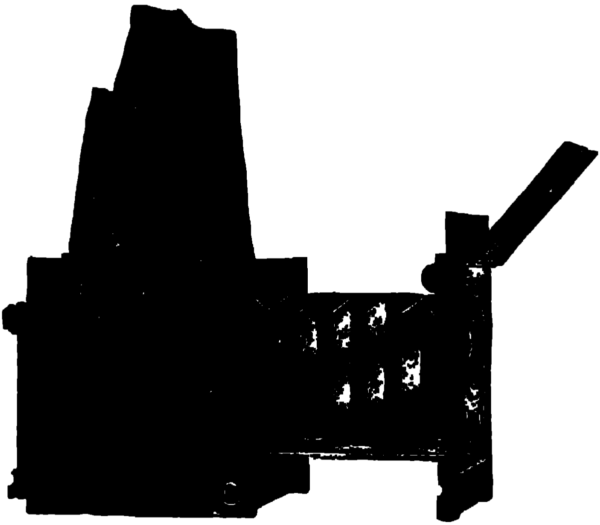
and rapid is the ... of the panel is £3 1... centimetre stereo "Pal... Complete with two grooves, the price ...dy for adjustment to a Zeiss 9 × 12 or to other suitable instruments.

THE "MINEX" REFLEX CAMERA

(Made by Adams and Co., 24, Charing Cross Road, London, W.C.)

In reviewing previous models of the Adams reflex we have confessed to finding it difficult to see what further refinements could be introduced into these instruments of precision, but in the pattern, the "Minex," which supersedes the two varieties of "Videx" which we reviewed last year, Messrs. Adams have, nevertheless, made really notable and practical advances. Within the past few years reflex cameras have practically all of them approximated to a type, though every make on the market has certain distinct features. To get one or even two given kinds of movement into a reflex is not difficult, but to embody in one instrument, and that a camera of the minimum size, the full range of facilities which a reflex camera worker can demand calls for the highest degree of mechanical skill. We are not exceeding the facts when we say that no other reflex camera provides (1) an equal range of movements, (2) an equal rapidity of manipulation, and (3) an equal degree of reduction to the fewest adjustments—all within the very smallest space.

The provision of these latest facilities in the Adams "Minex" centres round the shutter, which is of an entirely new pattern and works in conjunction with the mirror, the single three-quarter turn of the winding key serving not only to set the shutter but automatically to put down the mirror after the exposure Not only this, the adjustment of the shutter to the series of instantaneous speeds, as also to "bulb" and "time" exposures, is done simply by slightly pulling out the winding key and setting a disc attached to it to one or other of the points on a circular scale And in doing this it is immaterial whether the shutter be set or not, and, further, the speed at which the shutter is working cannot be altered, except intentionally, and is indicated both while the shutter is set or is run

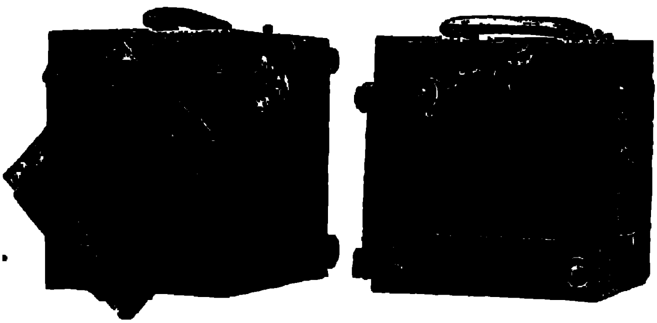


down This applies not only to the various rapid exposures, but to "bulb" or "time" In these two cases the indicator is simply turned to "B" or "T," and, in the former case, pressure on the release commences the exposure, which continues until pressure is released, whilst, in the latter, exposure commences on first pressing the release and is ended by giving a second pressure The wide range of instantaneous exposures is secured by aid of an auxiliary spring, so that alteration of spring tension is avoided Tension is changed from one to the other by turning the diamond-shaped lever seen in the bottom left-hand corner in Fig 1 In using the shutter, exposures marked in red on the speed dial are those obtained when the tension lever is set to "red" Thus it will be seen that there are no buts about the "Minex" shutter

The shutter itself safeguards the photographer from adjusting it when he should not do so, and it may be claimed to be immune against derangement by those even the most inexperienced. Even so, the makers affix the panel giving access to the mechanism of the shutter and mirror so that with the aid of a pocket screw driver it is immediately got at.

The camera is fitted with the rotating back working in a substantial German silver bearing, as in the previous models, but a new feature with the "Minex" is an ingenious masking of the focussing screen effected automatically by rotating the back, so that the picture seen on the screen is always the upright or the horizontal corresponding with the position of the plate. This is done, not with a rotating mask, which is a more bulky device, but by means of a pair of metal strips which in one or other position mask opposite sides of the ground glass.

The frontal mechanism of the camera remains very much the



same as in previous models. As before, the lens panel is of extra large size, accommodating the largest lenses, as also the very convenient four-way swing front, which is now issued with still a further minor improvement as regards operating it. As seen in the photograph, the camera has unusually large lens shade, the rising front is operated by rack and pinion, and gives the maximum rise, whilst the whole front at its full extension of 12½ ins. in the quarter-plate size is remarkably rigid.

The hood, which is of the type brought to perfection by Messrs. Adams, carries within it a pair of magnifying lenses which can be used or dispensed with as desired, but do not add to the bulk or form a separate accessory. Further, a ground glass for use at the back of the camera, as when focussing on a tripod, is carried between the hood and the board, to which it is attached, being thus secure from accidental damage. And this same feature of self-containedness is carried out in the chamber at the base of the camera, which provides space for two dark slides, so that, with a third slide carried ready for exposure, the photographer can go out pre-

pared with six plates without having to carry anything but the camera

We doubt if the maker of this beautiful and well-constructed camera in his most sanguine moods can see any means of further improvement The camera is a universal instrument ready for use with any lens suiting the size plate it is made to take and with any description of exposing apparatus, whether dark slides, changing boxes, film pack, or envelope adapter Complete with three double dark slides, but without lens, the price is the same in the $3\frac{1}{2} \times 2\frac{1}{2}$ ins and quarter plate sizes—namely, £29, £32 in 5×4 ins, and £41 in half-plate An extra to these prices is the charge for the four-way swing front—namely, 30s in half-plate and 25s in the three other sizes.

THE DALLMEYER TELE-PHOTO CALCULATOR

(Made by J H Dallmeyer, Limited, [illegible] Road, Neasden, London, N W)

The use of a graduated tape in estimating the magnification given by a telephoto lens has been carried out in the very compact form

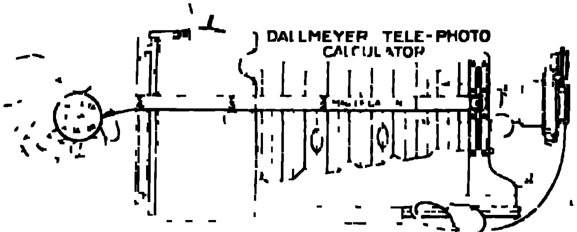


Fig 1

represented by this little attachment It consists of a spring stop measure, marked with a scale of magnifications corresponding with

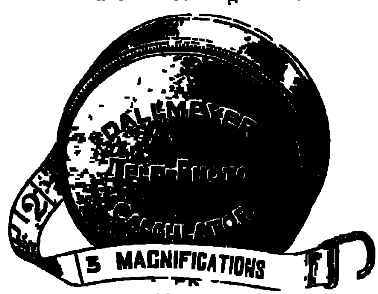


Fig 2

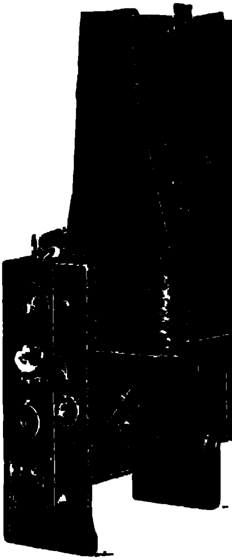
the negative attachment The free end of the tape is provided with a small hook, which can be attached to the lens front, the camera

extension thus serving to indicate at a glance the magnification at which the lens is working The little accessory weighs a shade over one ounce, and, as shown in the second drawing, which is a full-size reproduction, may be carried in the waistcoat pocket The reverse side of the tape is graduated in inches In ordering the calculator it is necessary to specify the focal length of the negative lens, the distance from the back surface of the negative to the point on which the hook of the tape will be fastened, and also the approximate total thickness of the glasses composing the negative Graduated for a particular lens, the price of the apparatus in brass is 2s 9d Additional scales may be marked at a cost of 1s each, and a morocco case for the calculator is supplied at 2s 6d

THE "GOERZ" FOLDING REFLEX CAMERA

(Made by C P Goerz, Optical Works, Limited, 1 to 6 Holborn Circus, London)

Messrs Goerz, whose reputation in the matter of folding focal-plane hand cameras is of longer standing than that of any other firm, and second to none in the design and substantial manufacture of their instruments have made quite a departure in bringing



out a reflex camera That the Goerz factory should provide photographers with a reflex instrument was a natural assumption, but that they should start by essaying the doubly difficult task of providing a camera of this type which would fold up was perhaps not to be expected, and therefore the mechanical perfection of the

new Goerz reflex is all the more a matter for congratulation The new camera is made in one size only, 5 × 4in., and measures when closed 7¾ × 7 × 3⅜, weighing, without the lens, 4lb 6oz

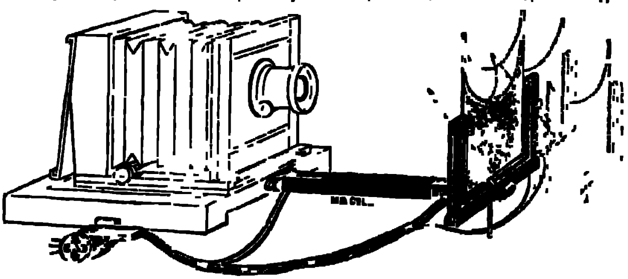
The back body of the camera carries the focal-plane shutter which is of the Goerz latest pattern, giving both the most rapid exposures and automatic time exposures Two rigid arms fixed in the back frame hold the front of the camera, and are turned downwards when the camera is folded, so that the lens points straight down when the user carries it by the strap The operation of opening the camera ready for use consists simply in grasping the lens and moving it upwards and outwards until it comes into the normal position This operation at the same time automatically depresses the mirror, and leaves the ground-glass in the position for exposure, so that the camera may be carried folded with the shutter set and a plate ready for exposure, and be ready for action within a second or two Similarly, to close the instrument the two side struts have simply to be pressed downwards and the lens returns to its normal position

The movement of the mirror and the quick adjustment by which it is raised or lowered by a half-turn of the milled screw are points to be mentioned as is also the rigid manner in which the focussing screen is held in a solid metal frame on all sides In other words the camera realises the conditions which are necessary in a reflex camera of precision while its lightness and portability bring it almost into line with a folding focal plane camera of the ordinary type The price of the instrument (5 × 4) complete with Goerz anastigmat, is £21 16s

THE "GOOD" STUDIO VIGNETTER

(Made by Marion and Co., Limited, 22 and 23, Soho Square, London W.)

This ingenious piece of apparatus provides a new and very facile means of working the vignetting mask which is used at the time of photographing the sitter In place of rigid metal adjustments, which are liable to stick, and, in any case, do not give a great



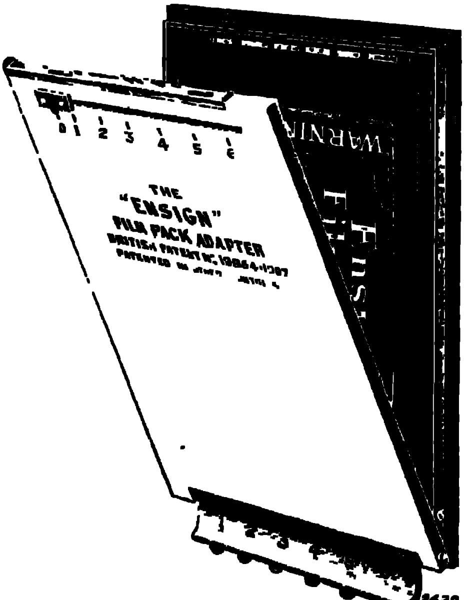
range of movement, the vignetter is operated by a modification of the Bowden flexible wire connection As shown in the drawing, the vignetting mask is mounted in a frame which travels upon a bar of square section attached to the front of the camera base

board The travel of the vignetter as also its adjustment up or down, sideways, and in a swing direction—is done by means of pressure only on four levers all placed together in a single mount This may be attached to one side of the camera, as illustrated or may be placed practically in any convenient position the mechanism operating the vignetter irrespective of the length or course of the connections The operator can thus modify the action of the vignetter whilst watching the effect upon the screen, in which connection it may be mentioned that the vignetter is pivoted along an axis opposite to the lens, so that when tilted the displacement does not alter the level of the serrated edge This useful apparatus is sent out with the arm in two pieces and complete with screws for putting together The whole attachment is fitted to the camera in a few minutes The price of the "Good vignetter is £2 5s

THE "ENSIGN" FILM-PACK AND ADAPTER

(Made by Houghtons, Limited, 88 and 89 High Holborn, London, W C)

The users of cut films will be interested in hearing of this latest device (for the exposure of flat films, purchased ready for use in a



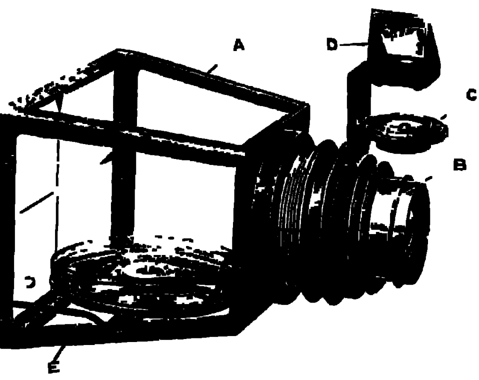
pack) The adapter consists of a chamber of light metal measuring only 6 × 3¾ × ⅜ in , or scarcely half the size of a double slide.

It is provided with a series of six keys, any one of which is pressed down as the shutter of the slide is withdrawn, and thus leaves ready for exposure in the camera that particular film The action we have found most simple and certain As the box may be reloaded by the user himself after development, this convenience of exposing the films in any order may frequently have an advantage The film is held very flat in the focal-plane, and may thus be recommended for users of large-aperture lenses, where perfect evenness of the sensitive surface is a great consideration In quarter plate size the price of the adapter is 25s , and of the pack of six "Ensign" films, ready for use, 1s 9d

THE ALDIS PHOTO-SURVEYING ATTACHMENT

(Made by Aldis Brothers, Old Grove Road, Sparkhill, Birmingham)

This is a piece of apparatus for use with an ordinary stand camera enabling the latter to be employed for the making of accurate survey negatives—that is, negatives from which the dimensions of the subject can afterwards be plotted off It consists of a rigid metal framework, the back frame of which is provided with fine

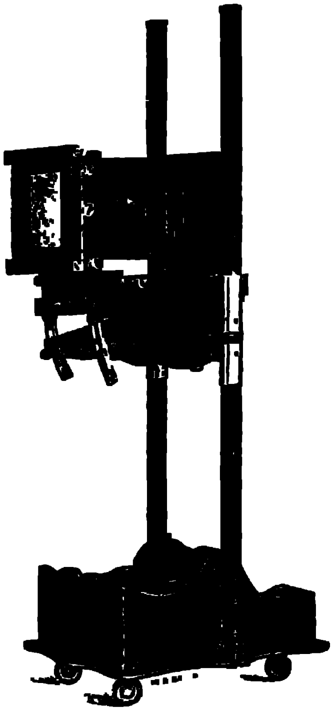


cross wires. A compass, the reading of which is impressed on the plate by the exposure, is mounted in the base of the frame, whilst the lens, which is made one with the apparatus, has attached to it a level and right-angled mirror, serving for conveniently adjusting the camera level The mechanical features of the apparatus allow of it being very rigidly secured in any ordinary stand camera, as shown in the drawing The price, complete with the No 1 Aldis anastigmat, compass and pointers, etc., is £5, including fitting, or without compass £4

THE "HANA" STUDIO STAND

(Sold by Marion and Co Limited, 22 and 23, Soho Square, London, W)

Professional photographers who have craved a studio stand which should permit of the very widest range of up-and-down movement and at the same time allow of the rapid manipulation of the camera with the minimum physical exertion should be satisfied with the new stand placed on the market by Messrs Marion from the designs of Mr Hana, the well-known photographer, of Bedford Street, Strand The stand consists of a pair of steel hollow tubes rigidly bolted to a base stoutly constructed in polished wood. Between the tubes a platform travels up and down vertically, its course being controlled by the two tubular pieces moving on the upright pillars The platform is attached to these two pieces in such a way that the photographer standing at the back of the camera can tilt it at any desired angle The whole combined weight of platform and camera mounted upon it is counterbalanced by weights moving in the tubular support, a thin wire cable tested to a weight of 200 lbs connecting the platform with the counterweight As a result of this the force required to raise or lower the camera is infinitesimal, whilst the length of the pair of supports allows of the camera being placed as high as 7 ft and as low as 2 ft above the ground After placing at any point the camera is instantly clamped by a species of band-brake, which is operated by a single pull of its lever Similarly, the angle at which the platform is tilted is fixed by turning down the handle seen on the right of the drawing The support of the camera in each case is of the most rigid description It should be added that the counterbalancing weight can be removed at the base of the tubes and reduced or added to as may be necessary, or, if more convenient, the exact balancing can be struck simply by placing a small weight, or even a box of plates, on the camera platform The stand is made to take studio cameras up to 12 × 12 ins , and costs, complete, £8

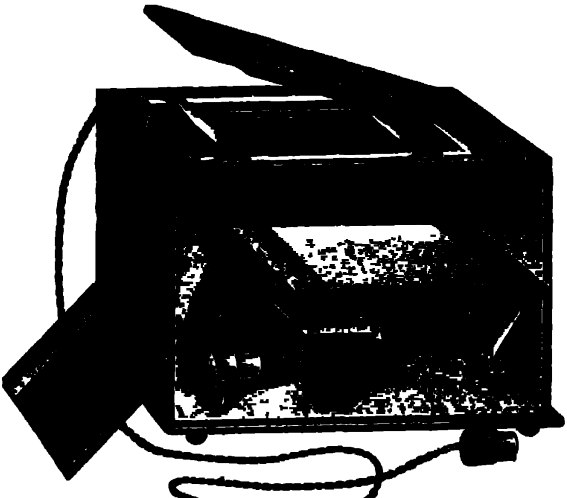


THE "KLIMAX" POSTCARD FRAME AND PRINTERS

(Sold by W Butcher and Sons, Limited, Camera House, Farringdon Avenue, London, E C)

In these pieces of apparatus Messrs Butcher provide a frame which can be used in the dark-room for taking off a number of identical prints from a negative in the ordinary way, or may be obtained as a printing machine with which exposure after exposure may be very rapidly given without the escape of any light in the dark-room The frame is identical in each case In the printers it forms the top of the apparatus, two patterns of which are made, one for electric light and another for incandescent gas

The "Klimax" frame will take a negative from 7 x 5 inches to the smallest size As shown in the drawing, it consists of a mahogany frame, the aperture in which is filled by a piece of ground



glass On this the negative in a suitable carrier is laid, the carrier for the sensitive paper or postcard is placed over the two studs and the spring clamps brought down in order to fix both negative and print carrier The negative is roughly placed in position when laying it in its carrier upon the ground glass, but the final exact adjustment may be made with the springs down Things having been thus arranged, the sensitive paper is placed in the space of the print carrier, the spring-back brought down, and an exposure made, these two operations succeeding each other very rapidly and allowing the worker to turn out a great number of prints (all identical as regards the placing of the picture) in a very short time The price of the

printing frame, complete with carriers for quarter and half-plate and with three masking gauges for the making of quarter-plate, post-card, and half-plate prints, is 6s 6d Two extra sets of gauges are supplied, No 1 to give six assorted openings quarter-plate size, and No 2 the same number for postcard size, the price in each case being 1s

Of the two printers we illustrate the No 2 model fitted with electric light It consists of a box measuring 9 × 12½ inches by 9½ inches high the top of which, as has been said, is formed by the "Klimax" frame The interior of the box, which is accessible by a hinged door at the front, contains an incandescent lamp, which is connected by means of a flexible cord and plug, supplied with the printer to any electric-light fitting The adjustment of the negative and the printing paper is made exactly as when using the printing-frame except that as regards exposure the act of bringing down the pressure pad upon the paper automatically switches on the light, which is switched off when the pressure is removed When light is required for the purpose of adjusting the negative the plug seen to the left of the frame is simply pressed down The printer, which is well made in polished mahogany, is sold for £1 5s, complete with two yards of flexible connection, plug, two negative carriers, and three printing masks, and provides a most inexpensive and effective means of postcard printing

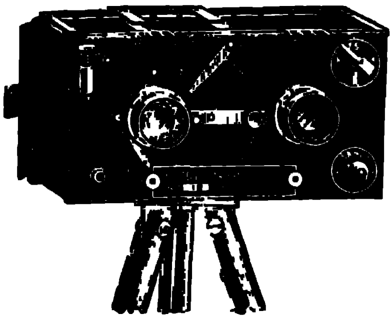
In the model No 1 for incandescent gas the burner is placed outside the apparatus and a mirror is provided in order to reflect the light up through the ground-glass screen In this case also, the act of bringing down the pressure board provides the illumination for the exposure, whilst also, as in the electric light model, the worker can obtain the illumination even when the pressure-board is up by actuating a stud which depresses the bye pass of the burner The incandescent gas model is sold at the price of £1 10s

THE STEREO-PANORAM CAMERA

(Sold by Ross, Limited, 3, North Side, Clapham Common, London, S W)

This is a very ingenious and practical metal camera taking plates 5⅛ × 2⅜ inches in single metal slides, and serving for making a pair of stereoscopic exposures, or one single picture of panel or panoram shape The camera is fitted with a pair of Ross anastigmats $f/8\ 5$ of 3⅛ inch focus The shutter, placed on the inside of the camera front, works just behind the lenses, and provides the exposure both for the pair of stereo pictures, or for the whole plate, with one of the lenses placed centrally on the camera front This latter alteration is made in an instant, one of the lenses is mounted to one side of a circular rotating panel, and the lever which brings it into the central position automatically removes the stereoscopic partition, and, at the same time, puts out of action the two side portions of the shutter working in conjunction with the pair of lenses The camera is similarly conveniently fitted with

a direct vision finder serving both for stereoscopic and wide angle or panoram use It carries a two way level, two strong bushes for use on a tripod, and the necessary adjustments for a series of speeds from 1 10 to 1 75 sec One good point is the mounting of the



lenses slightly above the centre so as to avoid excessive foreground and to allow, without use of front, of tall buildings being included Complete with six single dark slides and leather case for the outfit the price is £12 8-

THE "ROBINSON" ENLARGING AND COPYING CABINET

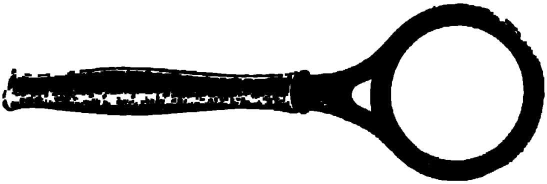
(Made by Marion and Co , Limited, 22 and 23, Soho Square, London, W)

Messrs Marion, who have of late specialised in the application of electric light to photographic purposes are introducing this very practical form of enlarging apparatus, in which a very even illumination of the negative up to 12 by 10 size is obtained without the use of a condenser The light is secured by a series of eight metallic filament lamps arranged to illuminate a surface of white paper, and the reflected light thus cast through the negative is found to be amply sufficient for enlarging This is due, as users of metallic filament lamps will realise, to the much greater actinic power of this type of electric lamp Not only can the apparatus be used for enlarging, but by replacing the white paper reflector by a black copy board the cabinet serves admirably for all kinds of copying work and for the photography of small objects, articles of manufacture, etc., for catalogue illustration To this end also it is provided with four sets of switches for the lamps, so that, if necessary, the illumination on one side or other of the original may be modified As supplied, the cabinet may be used as an enlarger in conjunction with any good camera, whilst when employed for copying purposes it simply takes the place of the easel and of any illuminating system which the photographer may previously have had in use

THE "PRIMUS" NON-STAIN PRINT LADLE

(Sold by W Butcher and Sons, Limited, Camera House, Farringdon Avenue, London, E C)

One of those handy contrivances of which, under the name of "Primus," Messrs Butcher in their time have introduced a large number, has been placed on the market under the above name, and as shown in the drawing, consists of a rubber ring about 2 ins in diameter mounted on a handle of hard wood This "print ladle" provides a very neat means indeed of transferring

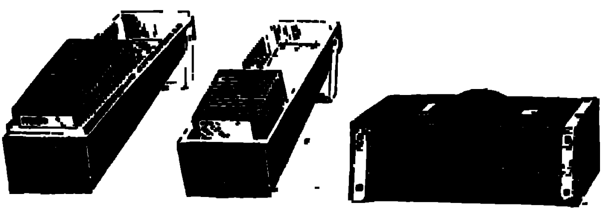


prints from the toning or developing bath to the wash-water and thence to the fixing solution, the worker having no need to allow his fingers to come in contact with the hypo bath The ladle serves very nicely to lift a print from its bath and after transference to press it gently beneath the surface of the hypo solution, and it should be its own recommendation to those who print on either a large or small scale The price of the ladle is 1s

THE "EXCELSIOR" TRANSIT BOX

(Made by the Camera Construction Company Eagle Works, Durham Grove, Hackney, London, N E)

In this box for sixty lantern-slides the diagonal construction, seen in the drawings, provides the very practical convenience that the lid of the box may be used as a receptacle for the slides as

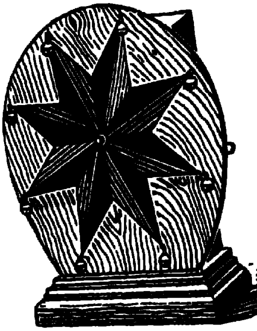


they come from the lantern The box is made with a very deep rabetted joint, serving very efficiently to exclude dust It is fitted with a strong brass clamp at each end and substantial leather handle The price in white wood, finished in black, is 3s, in polished mahogany, 4s 6d

THE PHOTO STAR

(Sold by F. E. Jones and Co., 22, Gray's Inn Road, London, W.C.)

This apparatus is an accessory for the studio, and forms an attractive means of securing the attention of sitters of tender age. It consists of a star formed of points of coloured metal, to each of which a small bell is attached. The "Star" is driven by clockwork mechanism, which also actuates a musical box, the apparatus being



set a-going simply by raising a lever by the side, when the star revolves and the music (with bells) plays until the lever is depressed, by which time the photographer should have secured a pleasing portrait of his child-sitter. The price of the apparatus, inclusive of packing and postage (inland), is 10s.

"COUNTESS" POCKET CAMERAS

(Sold by Sherwood and Seldt, 15, Mount Pleasant, London, E.C.)

In this series of cameras, the manufacture of the firm of Drexler and Nagel, of Stuttgart, a degree of compactness and particularly of almost wafer-like slimness is attained. We have before us three quarter-plate cameras, each sold as the "Countess," qualified by the Nos. 703, 723, and 833 respectively. In the two former, focussing is done by sliding the lens front along its runners, the front automatically snapping into focus for distant objects when the camera is drawn out on its baseboard. The actual thickness of the instrument when folded is distinctly under ¾ in., the size being 4¼ × 5¾ ins. In the case of the No. 833, which is a double extension camera with rack and pinion focussing, the camera when folded is a little thicker, but scarcely over 1 in. Yet all three instruments are provided with rising front, direct-vision finder, and, owing to their construction throughout in metal, are strongly made and firm when

erected for use No 703 is fitted with a single lens working at $f/12.5$, No 723 with a doublet working at $f/7.7$, both these lenses are mounted in a diaphragm shutter adjusted to time, bulb, and one instantaneous speed, in addition to a fourth adjustment which protects the lens from exposure by accidental pressure on the release In the case of the No 833 the camera at its full extension gives a distance from diaphragm to plate of 10 ins In this camera the doublet lens is mounted in shutter provided both with B and T and a series of exposures from 1 to 1-100 sec These instruments are issued at the very moderate prices of £2 3s for the No 703, £3 3s for the No 723, and £4 4s for the No 833, in each case complete with three single metal slides in carrying case These quite new models of pocket cameras should secure for themselves a great deal of interest among those commencing photography, and, of course, among dealers in photographic requisites

In addition to the above cameras there is also a series of still smaller size represented first by the Nos 101 and 21, taking a picture 1¾ × 2¼ ins, the outside dimensions of the camera being only 3 × 3½ ins by less than ¾ in thick To the No 101, which sells at 37s a single achromatic lens is fitted with shutter, giving time, bulb, and one instantaneous exposure, whilst in No 21 a Steinheil "Isoplast" lens at $f/6.3$ is provided at a price of 69s, although with Rodenstock aplanat $f/7.7$ the price of the tiny camera is 47s Though the camera permits of focussing, the short focus of the lens renders any adjustment unnecessary In each case the above prices refer to the camera complete with three metal single slides in case

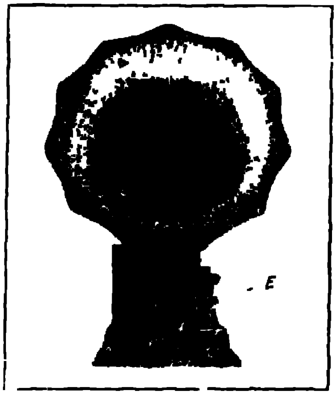
In the No 22, taking a picture 3¼ × 2¼ a speeded shutter is fitted, and the lens has rising panel with automatic catch, direct-vision finder and infinity catch Complete with three metal slides and adapter for "Premo" film-pack, the price with "Medioplast" lens working at $f/7.7$ is 56s The camera when closed has the very small dimensions of 3½ × 4⅝ ins × ⅞ in thick

THE "CINEPHONE"

(Made by the Warwick Trading Co, Ltd, 113, 115, and 117, Charing Cross Road, London, W C)

This is a gramophone talking-machine provided with a special accessory by means of which the special "Cinephone" films may be shown in any cinematograph lantern in exact synchronism with the words which go with them A special record for the gramophone is placed on the disc of the latter in the ordinary way A pinion from the gramophone is connected with the indicating box seen in the illustration, and on the appearance of the word "Cinephone" on the lantern screen the gramophone is started by pressure on the release On the dial of the indicating box there shows (in the dark) a white line, which is moved by the gramophone mechanism round the dial, on which are four illuminated dots A similar dial is photographed along with the subject at the time of taking the pictures, and, therefore, all the operator has to do to preserve exact

synchronism is to work the projector so that the pointer on the screen keeps time with that attached to the gramophone. We have seen for ourselves the very efficient way in which these talking pictures are produced. The price of the "Cinephone"—that is, of



the full size gramophone complete with indicator—is £9 10s in travelling case. The Warwick Trading Company have a considerable number of films and records for use on this very ingenious system. These they supply on an advantageous hire system.

THE DALLMEYER "STIGMATIC" LENS, SERIES IV f/6.3

(Made by J. H. Dallmeyer, Limited, 85, Denzil Road, Neasden, London, N.W.)

In this lens Messrs. Dallmeyer have provided a new variety of the well-known "Stigmatic" series which, by a simpler type of con-

struction, they are able to issue at a lower price, whilst at the same time the lens has certain novel features which will strongly

appeal to the amateur worker confined to one instrument and that one of moderate price The lens is made of unsymmetrical design, the back combination giving a picture nearly twice the size of that of the complete lens, whilst the front lens used alone gives a picture three times the size Not only this, but the extra extension required when using these components is very much less than usual, the back lens, in the case of the quarter-plate of 4¾ ins focus requiring only an additional extension of 2¾ ins, whilst the front lens needs a little more than double the extension of the complete anastigmat This feature of the lens particularly fits it for cameras which have not the very largest amount of extension, whilst the covering power of the complete lenses is excellent for the plate for which they are listed, and at a medium stop suffices for a plate of the next or even a larger size In cases where price is the decisive consideration the Series IV may thus be purchased in place of the Series II "Stigmatic" The Series IV are made in four sizes of 4¾, 6, 7, and 8¼ ins focal length, the prices being £3, £3 10s, £4 5s, and £5 15s respectively

THE "ACTO MIDG" MAGAZINE HAND CAMERA

(Sold by W Butcher and S , Limited, Camera House, Farringdon Avenue London, E C)

This magazine hand-camera includes quite a number of novel features, chief among which is the provision on the top of the camera of an actinometer the time taken for the paper to darken to the standard tint being used as the number to which to set the shutter Thus, an actinometer number of four seconds means that the shutter pointer is to be set to 4, which is the same thing as 1 60th sec The diaphragm scale is similarly turned to the class of subject being photographed, portraits and near objects being taken at f/11, and clouds and open seascapes at f/32 Street scenes, on the other hand are worked with a lens at f/16 These movements are calculated so as to give the plate a sufficient degree of exposure, and should be of much use to the amateur worker for this purpose At the same time it is necessary, in the case of moving objects, to use the shutter at a greater speed than is warranted by the actinic value of the light, but in such cases the readings of the exposure-meter give the worker a useful indication as to the extent to which he can reduce the correct exposure The camera is further provided with an automatic signal, which shows a red disc when a plate has been exposed The magazine carries twelve plates, which are changed by a very simple movement, is fitted with reversible brilliant finder bushes for vertical and horizontal pictures, all at the price of £2 2s, with single achromatic lens For £3 3s the camera is fitted with "Aldis" anastigmat working at f/7 7 and fitted in mount focussing objects up to 6 ft

THE PHILLIPS PHOTOGRAPHIC FOCUSSING SCALE CHART

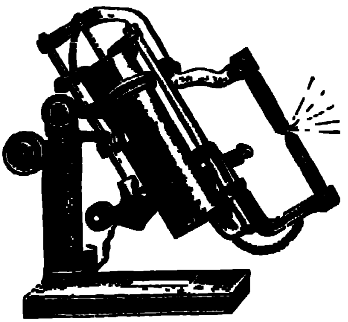
(Made by W H Phillips and Son, 98, Truro Road, Wood Green, London, N)

A very useful chart, allowing of a focussing scale for any lens from 3 to 10 ins focus being prepared without any calculation for distances from 5 to 100 ft, has been drawn up by Messrs W H Phillips, and is issued by them at the price of 2s 7d, post free, in cloth-covered case The chart may also be used as a means of ascertaining the focal length of the lens This is done by first focussing the lens on an object at a great distance, and marking the position of the lens-front on the fixed baseboard of the camera An object at 5 ft distance is then focussed, and a second mark made on the baseboard On comparing the distance between the two marks with the distances on the chart representing the focal extension for 5 ft and 100 ft, the focal length of the lens being examined may be picked out among those given

THE "EWON" SELF ADJUSTING ARC LAMP

(Sold by A E Staley and Co, 19, Thavies Inn, Holborn Circus, London, E C)

In this very convenient and portable lamp the feed of the carbons is controlled automatically, so that on coupling the lamp with the circuit the arc is at once struck without further adjustment, and will continue burning uniformly without attention The two adjustments provided are for raising the lamp as a whole and

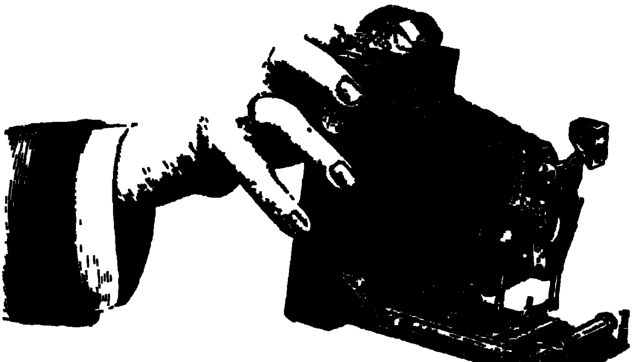


for moving it sideways in the lantern The lamps are sold complete with resistance plug, switch, and 10 ft of flexible connection at prices from £3 5s to £27, according to the amperage and voltage The smaller lamps are the most useful for moderate-power projection and enlarging That taking 6 amperes (direct current) gives a light of about 500 candle-power and costs £5 10s A 15-ampere lamp for direct current will cost £9 5s, and give a light of about 1,500 candle-power

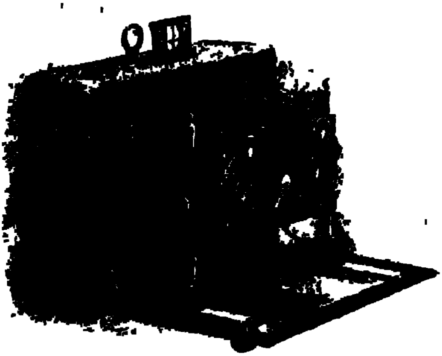
THE QUARTER-PLATE AND STEREO FOLDING "TENAX" CAMERAS

(Made by C. P. Goerz Optical Company Limited, 1 to 6, Holborn Circus, London, E.C.)

In addition to the $3\frac{1}{2} \times 2\frac{1}{2}$ "Tenax" reviewed in a previous "Almanac," the makers now have a quarter-plate model measuring,



when folded, just under $6 \times 4\frac{1}{2} \times 1\frac{1}{4}$ ins. As in its predecessor, the lens front is automatically extended by a pair of band springs, and the camera can then be racked out to a total distance of 9 ins. from



lens diaphragm to plate. As before, it is provided with rising front each way of the plate, reversible brilliant finder and hooded focussing screen. Complete with Goerz "Syntor" lens, "Com-

pound" shutter, and film-pack adapter, the price is £8, or, with Goerz "Dagor," £10

In the stereoscopic pattern the front pulls out upon its runners in the usual way, and is then racked forward to a total extension of 11 ins., the baseboard being clamped firmly at any point by pushing in the focussing head. The front carries a pair of Goerz "Dagors" of 120 mm. focus, each mounted in "Compound" shutters and placed on a panel, which is instantly detachable, and can be replaced by one carrying a "Dagor" of 150 mm. serving to cover the full size plate taken by the camera—namely, one of 10 × 15 cm. (= 4 × 6 ins., or postcard). The stereoscopic partition is also quickly removed, and the camera, as also the quarter plate "Tenax," is an example of the beautiful mechanical work of the Goerz factory. The price, complete with the three lenses and three single metal slides and film-pack adapter, is £26 10s.

THE "STEREOLETTE" CAMEO CAMERA AND ACCESSORIES

(Sold by W. Butcher and Sons, Limited, Camera House, Farringdon Avenue, London, E.C.)

Messrs. Butcher have lately provided the amateur worker with a variety of stereoscopic cameras and accessories at popular prices such as have not previously been at his disposal. Their special handbook, "Stereoscopic Pictures and How to Make Them," which is sent free on application, should be studied as an elementary introduction to stereoscopic photography, and as showing the very complete equipment, from the camera to printing accessories and viewing instruments, which Messrs. Butcher are able to offer. In the "Cameo Stereolette" a plate $4\frac{1}{4} \times 1\frac{3}{4}$ ins. is used (107×45 mm.).

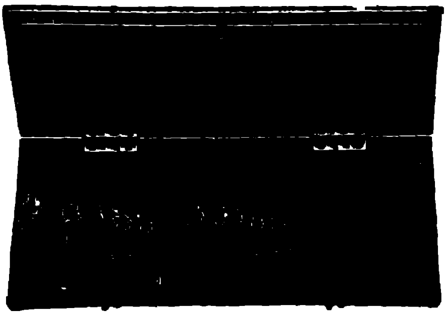
The tiny instrument is made throughout of light metal, and measures, when closed, under $3\frac{3}{4} \times 5\frac{1}{4}$ ins., and is barely $1\frac{1}{4}$ in. thick. It is provided with double ever-set shutter, having time, bulb, and instantaneous adjustments, level, brilliant finder, and focussing scale from infinity to 4 ft. At the price of £3 10s. the camera is fitted with a pair of R.R. lenses working at $f/8$, whilst for £8 it is supplied with $f/6.8$ anastigmats, and at £12 with Goerz

f/6 8 "Dagors" There is a rising front and convenient diaphragm adjustment actuating both lenses simultaneously The camera is designed to take single metal dark-slides, or, with special focussing screen, a film-pack adapter

THE "PRIMUS" STEREOSCOPIC TRANSPARENCY FRAME

(Sold by W Butcher and Sons Limited, Camera House, Farringdon Avenue, London, E C)

In this Stereoscopic Transparency Printing Frame the makers have conveniently provided for the printing, from the undivided stereoscopic negative, of a transparency by contact, ready for observation in the stereoscope This is done by making the frame of such dimensions that when the negative is pushed to one end and the transparency plate to the other the portions which overlap come exactly opposite the central opening, which is provided with a brass sliding shutter. The relative positions of negative and transparency having been reversed, a second exposure is



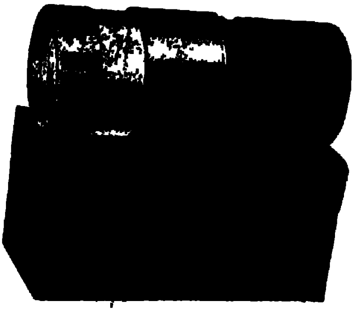
given and the plate developed The frame is made of a size for the "Stereolette" camera (4¼ × 1¾) for 4s 6d, or of the standard, 6¾ × 3¼, plate at 6s 6d, in each case being well made in polished wood, and provided with spring contact pressure board

The principle of the transparency frame just mentioned is extended in these gauges to development or printing out papers The gauge consists of a stout cardboard in which is an aperture the size of the stereoscopic picture, say 1½ ins in the case of the "Stereolette" There are two series of stops on the gauge, one for the negative and another for the postcard In printing, the negative is pushed up to the right-hand stop and the postcard to its left-hand stop, exposure given either by printing out or exposing to artificial light, and the relative positions of postcard and negative reversed—that is to say, the postcard pushed to the right-hand stop and the negative to the left A second exposure gives the complete stereoscopic card, which is then toned or developed These very inexpensive and convenient gauges are supplied for negatives 4¼ × 1¾, 1s 3d each, for postcard negatives 5½ × 3½, 1s 3d each, and for 6¾ × 3¼, 1s 6d each

THE "PANCRATIC" TELEPHOTO LENS

(Sold by A. E. Staley and Co., 19, Thavies Inn, Holborn Circus, London, E.C.)

This is a very portable telephoto lens complete in itself, and giving magnifications from three to eight times. The focal length of the positive being about 6 ins., and that of the negative about 3 ins., with a camera extension of about 6 ins., it covers the quarter-plate excellently at three magnifications—that is, at the lowest power at which it is made to work, whilst at the higher magnifications the little lens can be used quite well on a half-plate. The fact that



the positive lens is single is no doubt responsible for the very bright images given by the "Pancratic." The lens is sent out in a pair of separate mounts ready for screwing into shutters of the Bausch and Lomb "Automat" type, etc., a pair of extra metal cells being included in order to fit it for use with any commercial pattern of diaphragm shutter in general use. The price of the lens thus complete in a neat leather case is £3 3s.

THE ERNEMANN "VEST POCKET" CAMERA

(Sold by Charles Zimmermann and Co., Limited, 9 and 10, St. Mary at Hill, London, E.C.)

Of pocket cameras for plates, quarter-plates and under, we have seen many varieties of late, but for a really nice model at a moderate price of a pocket camera we have seen none that combines so many good features as the camera made under the above name by the well known firm of Ernemann. The camera takes pictures a shade larger than 2¼ × 1⅝ in., and measures outside less than 3¼ × 2½ ins. by 1⅛ in. thick. It is self-erecting, the front coming out into the position of focus for distant objects on pulling down the baseboard. Naturally with a lens of the short focus of 3¼ ins. the depth of focus is very great, nevertheless the makers provide focussing for objects up to 4½ ft. from the camera, but for 90 per

cent of the exposures there would be no need to use this adjustment, since at the full aperture of the lens all objects up to 10 ft of the camera will be in sharp focus The lever focussing movement, we would add, as befits such a small instrument, is very smooth, and the pointer very nicely adjusted on the scale. The camera is fitted with two brilliant finders for horizontal and vertical pictures, with diaphragm shutter giving time, bulb, and five instantaneous speeds, and rectilinear "Aplanat" lens working at

f/6 8, the prices being 45s and 55s, according to the shutter, inclusive of hooded focussing screen and three single metal slides in a wallet about the same size as the camera For 85s and 95s respectively the camera is fitted with the Ernemann anastigmat f/6

A daylight enlarger can be supplied for the camera to enlarge up to ½ plate The negative is placed under a frame at one end, and a piece of bromide paper or a plate at the other A shutter is fitted to the lens Price 20s

ERNEMANN "TINY" AND "STEREO-TINY" ROLL-FILM CAMERAS

(Sold by Charles Zimmermann and Co, Limited, 9 and 10, St. Mary at Hill, London, E C)

In the "Tiny" roll film camera the size of picture is 1½ × 2½ ins, a No 0 or 2 in spool being used The outside dimensions of the camera are only 6 × 3 ins, by a shade over 1¼ in thick, but the little instrument is fitted with diaphragm shutter carrying the Ernemann double anastigmat, of f/6 aperture and 3¼ ins focus, reversible brilliant finder and considerable rise of front, the lens-panel being locked by a spring at any point of its travel There is also a cross front movement giving rise the landscape way of the plate In the normal way all objects up to 10 ft. of

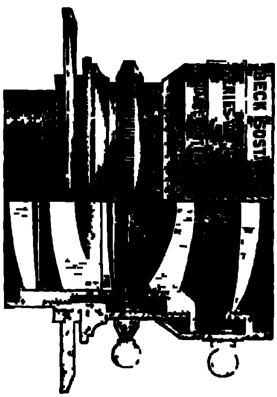
the camera are in focus, but the focussing scale provides for focussing within 4½ ft The camera is of excellent workmanship, and costs, as above described, 95s., or 50s with the Ernemann "Aplanat" f/6 8 Although of such small size, the camera will thus be seen to possess a full range of movements

In the "Stereo Tiny" a pair of lenses of 3 ins focal length are provided, whilst each stereoscopic picture measures just under 1¾ in square Complete with paired Ernemann "Aplanats" mounted in "Auto" shutters and adjusted to give one instantaneous speed in addition to time and bulb, focussing scale, and brilliant finder the price is 70s Like its single pattern, the "Stereo" is very strongly made

THE ISOSTIGMAR VARIABLE PORTRAIT LENS, f/5 6

(Made by R and J Beck, Limited, 68, Cornhill, London, E C)

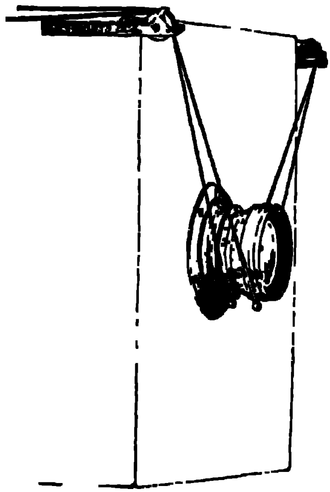
In this new series VI of the Isostigmar anastigmats the makers have provided a feature of special importance to the professional portrait photographer that is to say, an adjustment is supplied by which certain degrees of unsharpness can be introduced at will and —what is perhaps most useful—repeated at will Such a provision may often be employed to good advantage in portrait photography, and it is not too much to say that a good deal of the very best



portraiture has been done with lenses giving more or less diffused definition

This lens, when the special variable adjustment is not in use, behaves as a very well corrected anastigmat, and at full aperture we find the 9½-in lens submitted to us covers a half-plate with surprisingly good definition The adjustment provided is a variable separation between the front two lenses By turning the lens-hood the separation is increased or diminished at will, and so varying

degrees of diffusion can be introduced A scale is provided which enables us to record the amount of adjustment found to be desirable for particular purposes, and thus it is always possible to return to any particular degree of diffusion at will The objective is well finished, the mount being brass, and the price is very moderate, £7 7s for a 9½-in lens working at $f/5\ 6$ not being out of the way



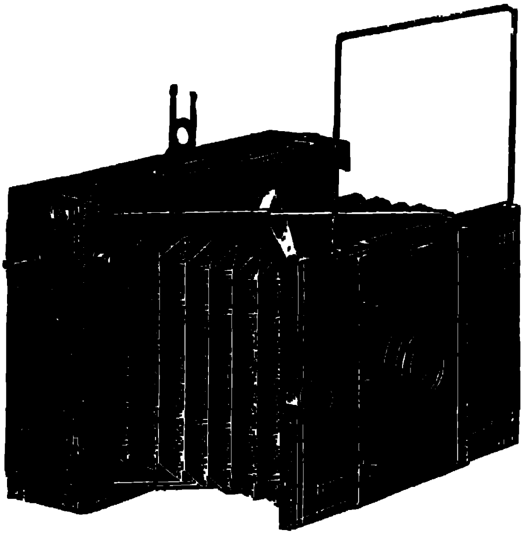
The 12 in lens costs £14, and the 17 in £22 The hood-ring, and also the iris-ring, are so fitted that by a system of cords and pulleys the adjustments both of aperture and definition can be made from the back of the camera while focussing, and the prices include these fittings For portraiture this should be a very useful lens, and the fact that it will also serve all the purposes of an anastigmat adds greatly to its value

"NETTEL" FOCAL-PLANE CAMERAS

(Sold by A E Staley and Co, 19, Thavies Inn, Holborn Circus, London, E C)

A number of most excellent features from the practical point of view are embodied in these cameras, of which we will describe the ordinary folding focal-plane, the self-capping "Nettel," and the "Stereax" In these cameras the focussing movement is done from the back through a system of levers which holds the front, this plan having the double advantage that the setting of the camera to any distance is under the eye of the worker, and, further, that the camera can be closed with the focus set for any given distance On pulling out the front it is then at once ready for exposure, and we would emphasise here the convenient manner of extension, the

camera being simply pulled forward with one finger by the clip seen on the front in the drawing. Similarly, the camera is closed by first pressing on a stud on the back, at the same time pushing in the front. It is the most readily opened folding focal-plane camera that we know.



As regards other movements, it is fitted with double lens panel, rising and falling in each direction, with bushes for attachment to tripod, and with Iconometer direct finder. Focussing, as we have said, is done with the spindle pinion on the right hand just above the winding key of the shutter. This latter, in the ordinary model, is fitted with adjustable slit and spring tension, giving the [illegible] last range of speeds, whilst the shutter can be very quickly set to time, and then gives a very nice and gentle time exposure. The necessary readings of slit aperture and spring tension are very readily seen, the former through an aperture in the top of the camera, and the latter on the scale seen just below the winding-key in the figure. In addition, it has the convenient opening when focussing described in connection with the self-capping "Nettel." The convenient assemblage of all the working parts in one place is a feature of the camera, which, in the quarter-plate size, without dark-slides or lens, costs £5 10s.; in 3½ × 2½ ins. £5.

In the self-capping pattern of "Nettel" these same features of convenient and rigid extension are preserved, as is also the facility of leaving the camera at a set focus. The shutter, however, is of the self-capping variety, and is, moreover, adjusted to give a range

of speed which it is uncommon to find provided by makers of focal-plane shutters—namely, 1 sec., ½, ⅓, ¼, ⅙ sec., etc.—in addition to time and bulb exposures. This is secured by a series of three separate tensions of the spring, each used in conjunction with the alterable width of the shutter slit. The adjustment for width of slit is made by pressing down the milled ring surrounding the winding-key. A series of scales engraved on the disc between the ring and winding-key gives the values for the different speeds, among which, as we have said, are the very useful large fractions of a second. Mention should be made of the convenient movement whereby a full view of the plate is obtained, however the shutter is set, simply by pressing down a lever on the right, when a turn of the winding-key opens the blind to the full width of the plate. On then releasing the shutter and re-winding, the act of an instant only, the adjustment automatically falls out of action, and the shutter can then be wound to whatever speed it is set to. This is a most valuable movement, as it allows of very rapid inspection of the focussing screen being made in the intervals of photographing a series of pictures.

The camera has two-way rising and falling front, and, like the previous model, is very strongly made throughout. The price of the self-capping "Nettel" in 3½ × 2½ size, without dark slides or lens, is £6, in quarter-plate, £6 15s., in postcard, £7 10s., and in half-plate, £8.

THE "MERITO" FILM TROUGH

(Sold by W. L. Parkinson, Limited, 5, Commutation Row, Liverpool.)

In the new model of this apparatus the fixed bar under which the strip of roll-film had to be passed is made detachable and falls into a bearing on either side of the dish, so that in commencing development it is only necessary to lay the roller on the film,

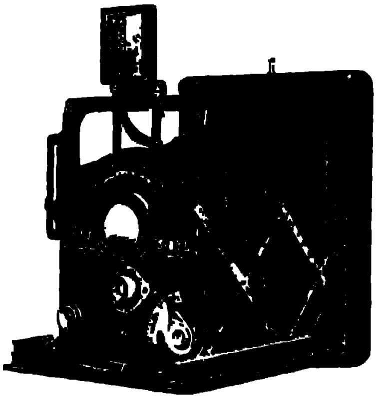
take up the two ends of the latter, and allow the roller to drop into its bearings in order to commence development. For developing roll film in the dark-room so as to allow of separate exposures being watched during development the new model of the dish is a very convenient one. The prices are in quarter plate size 2s., half plate 3s. 6d.

THE "SIBYL" QUARTER-PLATE "SPECIAL" AND "DE LUXE" POCKET CAMERAS

(Made by Newman and Guardia, Limited, 17 and 18, Rathbone Place, London, W)

The "Sibyl" camera, first designed of the $3\frac{1}{4} \times 2\frac{1}{4}$ size in order to provide, in the minimum of space, a hand camera of full range of movements, is now obtainable in quarter-plate size, in designing two new models of which size, the "Special" and the "De Luxe," the latter a double extension instrument, the makers have provided facilities additional to those in the original model, now designated the "No 5" (Tessar), and the "No 6" (Cooke), in reference to the lenses they carry

A series of "Sibyl" Special patterns is designed on the same lines as the Nos 5 and 6—that is to say, the front is carried on lazy-tongs and on the baseboard being let down, runs out to its place almost by its own weight, requiring a touch to snap it into a position, which is most

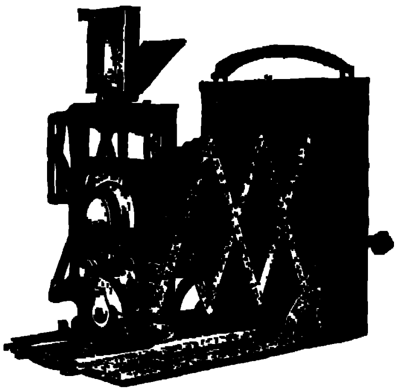


rigid As in the $3\frac{1}{4} \times 2\frac{1}{4}$ size, the focus may be left set at any point from infinity to two yards, and the camera is obtained set at this same index when re opened In the present "Special" model two features are added to the focussing adjustments In the first place a "depth scale" is provided showing the area of correct focus for every stop of the lens, and, secondly, the focussing plate is provided with an adjustment for setting the focus either for plates (in single metal dark slides) or for films in a film pack Lastly, the camera will take the large aperture lenses, the $f/4.8$, Goerz 1B "Celor" or the Zeiss $f/4.5$ Tessar, the former of 5 in and the latter of 6 in focal length The other adjustments remain the same The rise of front which, in the "Special," as in the Nos 5 and 6 instruments, is provided for the upright plate only, is 1 in, the shutter has the range of speeds $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, 1-16, 1-32, 1-64,

1-100 second, and a direct-vision finder is fitted, which, as described below in the case of the "Sibyl de Luxe," is fitted with mirror for use at a lower level The whole instrument, in short, has the same practical features and perfection of mechanical construction as the first model, being made entirely in metal, leather-covered, with rounded corners and slipping into the pocket like a cigar case Its outside dimensions are 6 ins × 4¼ ins × 1⅝ in, and its weight just under 20 ozs Its price, with the Goerz lens, is £16 16s, or with the Zeiss, £17 17s

In the case of the Nos 8 and 9 "Special" patterns lenses of f/6 3 aperture are provided and in these cameras rise both ways of the plate is available

The double extension "De Luxe" or No 1 model of the Sibyl, is not quickly described, since it contains several new features The



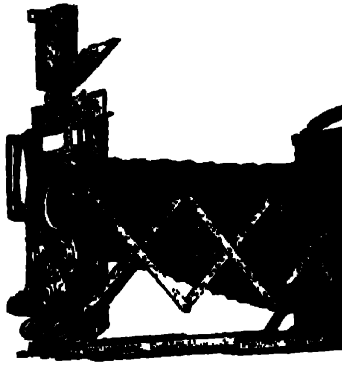
general type of construction is the same, the metal base, the rigid lazy-tongs extension The focus plate as before is adjustable for both plates and films, and focussing scales for the whole and the half lens (long focus) provided to work with the same index, which, as in the "Specials," is provided with depth of field indicator The front is brought into position somewhat differently It is drawn forward by the pair of handles a little further than necessary, and caused to engage on the focus-plate by being pushed back For the long extension all that is necessary is to release and pull forward the focus plate, when the same lines in the 'De Luxe" on the side of the camera provides the adjustment for focus

In the "De Luxe" pattern the front is made narrower, and is mounted so that in addition to the ample rise the upright way of the plate, both rise and fall, the landscape way is obtained, in each case equal to about one-quarter the dimension of the plate The finder is very ingeniously contrived with a mirror at back of it, serving to

use the finder at a low level, while when using the camera at the eye level the mirror is turned out of the way The lens frame of the finder is marked to indicate the subject, including both "upright" and "landscape" way of the plate, and with both long and normal focus The finder also carries two levels, and further on being turned down neatly stows itself away on the camera front

The lens for which the No 1 "De Luxe" Sibyl is adapted is the Zeiss Series VIIa f/6 3 aperture and 5 ins focal length This gives a long focus lens of 9 ins when the back combination alone is used Messrs Newman and Guardia adopt the convenient bayonet joint method of securing the front combination, which thus can instantly removed and is put for the time being in a place provided for it in the back frame of the camera

One further novel and useful feature must be mentioned In order to provide against the two disabilities of a loose tripod screw and the



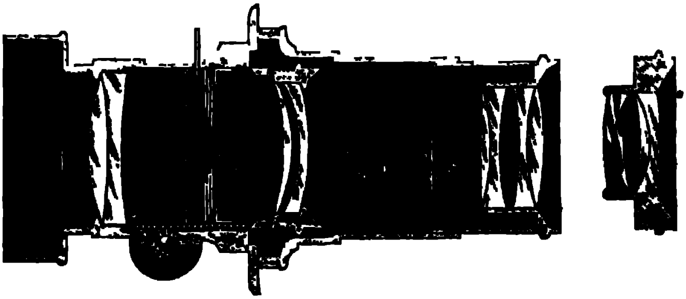
short bush of it which a light and compact camera entails, Messrs Newman and Guardia secure the tripod screw permanently to the camera by means of a recessed metal shell, which is made to form part of the back body of the camera The tripod head to receive the screw is either cut away or is provided with a key hole-shaped aperture, through the large part of which the screw is introduced, slipped over into the constricted portion, and made fast with the nut The arrangement accomplishes the desirable end of providing a quick attachment of the camera to the tripod, a thing which is all the more necessary in the case of the "De Luxe" Sibyl, which is as eminently fitted for use on stand as in the hand

Although allowing the use of a 9 in lens, the camera is very little larger than the "Special" pattern, but yet provides most conveniently a full range of movements, every one of which is embodied in workmanship which is the perfection of strength and ease Complete, with Zeiss lens and six slides in case, the price is £21.

A DALLMEYER HAND CAMERA TELEPHOTO COMBINATION

(Made by J. H. Dallmeyer, Limited, 25, Newman Street, Oxford Street, London, W.)

Messrs. Dallmeyer have just put up in a special light aluminium mount, with a view to the use of the lens for hand camera photography, their 1A positive lens in conjunction with a 4-inch negative. This allows of a very considerable range of foci, and gives, for example, an equivalent focal-length of about 30 inches with a camera extension of just over 5 inches, and this at an aperture of



f 12, which is quite sufficient for a very large proportion of hand-camera work. In addition, the user of this combination has the advantage of the use of the positive as a separate lens of *f*/4 aperture and focal length 10 inches, the positive, moreover, having the adjustment of the separation of the elements of the back combination so that several degrees of diffused focus may be introduced when desired. The price of the whole lens, which as sent out by the makers measures 11 inches and projects just over 2 inches behind the lens flange, is £20 10s.

THE ROSS UNIVERSAL STAGE ENLARGING LANTERN.

(Made by Ross, Limited, 3, North Side, Clapham Common, S.W.)

In a new pattern of the well known cantilever type of enlarger made by Messrs. Ross the negative carrier is pivoted on either side of the lantern so that the negative can be tilted out of its normal position at right angles to the axis of the lens, and thus lines which are "out" owing to the camera having been tilted at the time of making the exposure corrected in making the enlargement. This movement, a very essential one in an enlarger, is supplemented by rack and pinion adjustment of the negative carrier both up and down and sideways, so that the centring of the image in making the enlargement is most conveniently done. The stage is most excellently made in metal, the rack adjustments work very sweetly, and the stage is automatically fixed centrally when pushed into the enlarger.

THE STALEY COLLAPSIBLE TELEPHOTO HOOD

(Sold by A. E. Staley and Co., 19, Thavies Inn, Holborn Circus, London, E.C.)

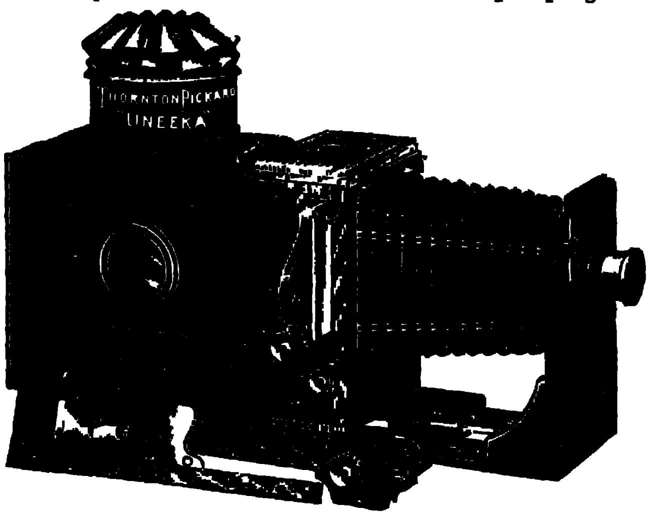
A most useful accessory for the telephoto worker is a hood for the lens which can be adjusted according to the angle of view being included by a telephoto lens. In this little hood the makers provide

a total length of 10 ins., and by making the tube in three portions they reduce its size when collapsed to less than 4 ins. by $1\frac{1}{4}$ in. diameter. The tube is excellently made in light metal fitted with threaded attachment at the rear end. The price is 15s.

THORNTON-PICKARD "UNEEKA" AND "ROYAL RUBY" ENLARGERS

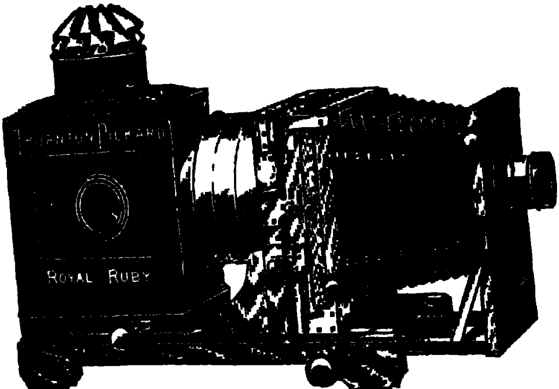
Made by the Thornton-Pickard Manufacturing Company, Limited, Altrincham, Cheshire.)

The "Uneeka" fills a gap in enlargers since it provides at a moderate price, a lantern for the enlargement of $3\frac{1}{2} \times 2\frac{1}{2}$ negatives,



and is equally efficient when used for projecting ordinary lantern slides or for science demonstrations in the open stage afforded by

the removal of the bellows It is fitted with 4¼-in condenser, mounted in a mahogany box, in which also is the negative or lantern slide stage, the box resting on the base of the lantern and secured in place by a screw inserted from below and readily withdrawn when it is required to polish the condensers The stage allows of the central swing of the negative, rise-and-fall, and rotating movements, in each case by rack and pinion, whilst the negative may also be adjusted sideways Although made primarily for the 3½ × 2½ size, the lantern is fitted with negative carrier to hold a quarter-plate, part of which may thus be enlarged, whilst an inner carrier serves to hold the 2 5/16 × 1¼ negative, now coming largely into use in what we may call the "ultra pocket" cameras The carrier being removed, the stage takes the "Merito" lantern-slide carrier, and then serves equally well as a projection lantern,



whilst the ready removal of the bellows from its support at each end allows of pieces of scientific apparatus, troughs, etc, to be placed in the optical system The apparatus is strong, but weight is removed from all portions where it fails to give strength, so that the lantern is surprisingly light Complete with achromatic projection lens, lantern slide carrier and tray, but without light, the price is £5

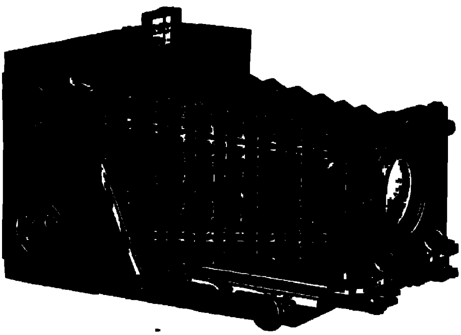
In the "Royal Ruby" the Thornton-Pickard Company have embodied many of the excellencies of their cameras in an enlarging apparatus, all the movements of which—and they include everything which an enlarger can be expected to do—are actuated by rack and pinion Thus the lantern body, the three separate movements of the negative carrier (tilt, rise-and-fall, and rotatory), together with the rise and fall of the lens, are fitted with rack and pinion, the pinion

head in several instances serving also to lock the moving part The lens front and the condenser frame are rigidly held by right-angled stays, whilst the bellows may be completely removed and the lantern used for optical and scientific projection One excellent feature of the series is that the negative carrier of each lantern is built large enough to hold a negative of the next larger size, though the whole negative is not completely covered by the condenser, parts may nevertheless be enlarged The price of the enlarger, complete with condenser and portrait objective, is £10 10s in quarter-plate, £11 15s in 5 × 4 and postcard, and £14 10s in half-plate The very convenient movements and excellent workmanship of the instrument deserve every commendation A separate frame is provided to replace the negative carrier when the "Merito" lantern-slide carrier is being used This, together with extra 4½ condenser and the slide carrier, costs 25s in quarter plate, 5 × 4, and postcard sizes, 30s in half plate

THE VOIGTLANDER FOCAL PLANE CAMERA

(Made by Voigtländer and Sohn, 12, Charterhouse Street, London, E C)

The Voigtländer focal plane shutter of beautiful workmanship and convenient design is embodied in this new edition to the Voigtländer hand cameras, which, as shown in the drawing, is of the dropping baseboard pattern similar to the 'Alpine' camera of the Brunswick firm which was fitted with a lens shutter The new camera in the quarter plate size gives an extension of 10½ ins , has



front of sufficient size to take the "Heliar" $f/4.5$ lens of 7 ins focal length, the front having rise and cross movements The camera is made throughout in metal, and the act of opening it throws down the baseboard and at the same time erects the finder Of very substantial construction the camera is particularly fitted for use in tropical countries whilst the ready alteration of the shutter from instantaneous speeds to time and from one speed to another even while the shutter is set fits it for all kinds of photo-

graphy The release is made either by trigger or "Antinous" attachment (detachable) Complete with three double book-form dark slides in ebonised wood with a novel description of catch for the shutters, but without lens, the price is £16 10s

THE VOIGTLANDER "DYNAR" LENSES FOR KODAKS

(Made by Voigtlander and Sohn, 12, Charterhouse Street, London, E C)

For convenient fitting of the "Collinear" and "Dynar" lenses to Kodak and other cameras provided with diaphragm shutters Messrs Voigtlander are now supplying the components of these lenses in separate cells ready for screwing into the shutters, thus the "Dynar" f 6 of 5 ins focal length suitable for No 3 Kodaks is supplied at £4, the "Collinear" III f 6 8 at £5 5s Similar lenses for the No 3A F P K are supplied at £4 15s and £6 3s respectively In ordering these forms of Voigtlander lens mention should be made of the type of shutter for the camera being used—whether a black Kodak "Auto," bright Bausch and Lomb "Auto" or bright "T B I" shutter

"EXCELSIOR" METAL TRIPODS

(Sold by F G Phillips, 12, Charterhouse Street, London, E C)

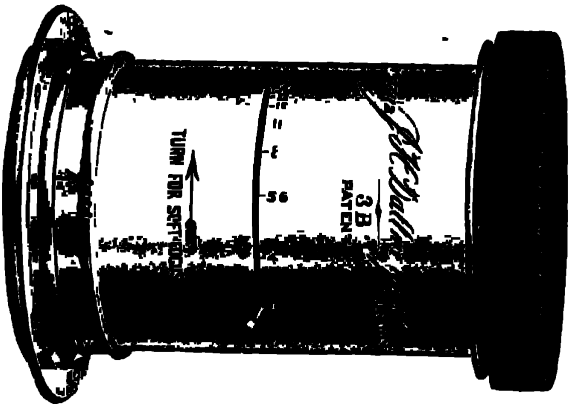
Three patterns of very portable telescopic tripods are supplied under this name, each in a series of six or seven sizes, affording a total length of leg when fully extended of from 44 to 58 ins The A pattern of extra strong type is composed of round brass tubes with an outer tube of black or nickel, the B pattern is similar, but somewhat lighter, whilst the C is fitted with aluminium tubes and is thus extremely light In each case the tripod is fitted with double-spring catches lying loose in the tubes and, therefore, not liable to get broken off moreover, the tubes engage only at the ends, so that they work very free when opening and closing; further the head of the tripod is reversible, one side being fitted with the English standard screw and the other with the Continental The prices of these very portable and rigid tripods range from 7s 6d for an A pattern 44 ins when extended to 18s for a C pattern extending to 50 ins

THE DALLMEYER PORTRAIT LENS MOUNT

(Made by J H Dallmeyer, Limited, 25, Newman Street, Oxford Street, London, W

The latest form in which the renowned Dallmeyer portrait lenses are made is one which has been worked out within the past few months, and marks a very great advance as regards portability, lightness, and convenience in use over the original model provided with rack and pinion focussing, which may now be regarded as obsolete Studio cameras being now fitted with all manner of focussing conveniences, the rack and pinion on the portrait lens is merely a relic of the days when a box form of fixed-focus camera was employed it makes two separate tubes necessary, and thus

adds to the weight, bulk, and cost of the lens Messrs Dallmeyer, however, issue all their portrait lenses in a single tube provided with iris diaphragm, the perfectly circular aperture of which at all sizes calls for special mention The chief element of novelty, therefore, in the new mount is the provision made for separating the two back elements of the lens in order to secure soft focus This is done simply by turning the barrel of the lens one half-turn being made for about the minimum degree of diffusion, one complete turn



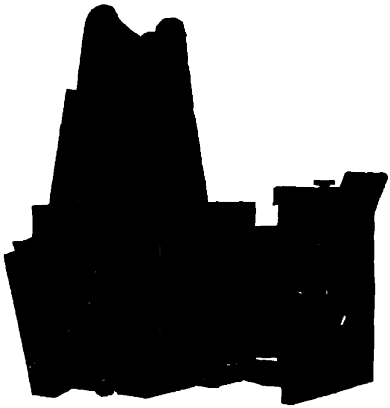
for a further amount, and successive complete turns, up to a total of about four, for greater extremes of diffusion This adjustment is provided by a suitable choice of right-handed and left-handed threads, so that it is impossible to unscrew the lens as a whole from the flange instead of making the adjustments for softness, and the result is secured without the aid of the locking bolts which represented an intermediate stage in the development of the Dallmeyer lens mount All the portrait lenses now issued by Messrs Dallmeyer are mounted in this convenient way

THE $3\frac{1}{4} \times 2\frac{1}{4}$ N AND G REFLEX

(Made by Newman and Guardia, Limited 17 and 18, Rathbone Place, London, W)

We note with some satisfaction that a $3\frac{1}{4} \times 2\frac{1}{4}$ model of the admirable "N and G" reflex camera has been introduced In the article in last year's "Almanac" on "Reflex Cameras" we commented on the many advantages of the $3\frac{1}{4} \times 2\frac{1}{4}$ size over the quarter-plate As regards bulk, the new "N and G" model measures 6 × 6 × 5 ins , and is issued in all respects on the lines of the "N and G" "Square Reflector" reflex as at present made This, we should explain, has been improved in some details during the past year One important alteration is the introduction of a different pattern of hood The more usual collapsible

hood held by a light metal strut is employed, the hood itself folding up and being covered when out of use by the hinged top of the camera to which is fixed a carrying strap. The ground glass



is thus fully protected and the alteration does not affect the convenience with which the ground glass is rendered accessible for dusting or wiping. The base of the hood is fixed to a metal frame, which is instantly detached, as, in fact, is the complete hood, the upper portion being held to the inside of the hinged back of the camera by a couple of studs sliding in slots.

In addition to this change, a release for the shutter, as also a focussing-pinion head, is provided on each side of the camera, and, further, a camera strap is provided on the side and top of the camera, the spring catch of the latter being of the full strength and length necessary to hold the lid firmly.

As in previous models, the "N. and G." is free from projections, and the new model carries this good feature even to the point of making the two eyes to which is attached the carrying strap to fold down against the sides of the camera, and thus be secured from accidental damage. The only piece of mechanism which actually projects is the winding key of the shutter, and that is placed very securely in the angle formed by the camera back and the top of the rotating back, so that except an absolutely wilful blow be given it, it is practically safeguarded from damage.

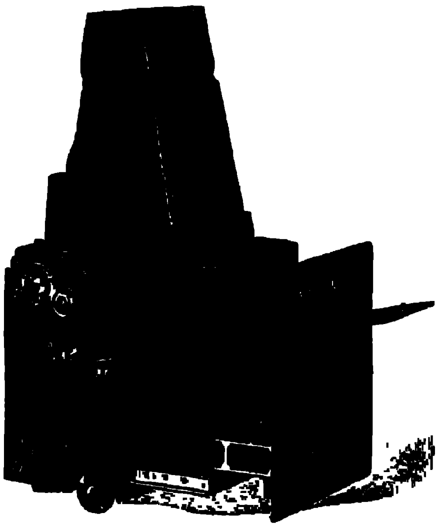
"ROYAL FOLDING" REFLEX AND "TROPICAL" REFLEX

(Sold by A. E. Staley and Company, 19, Thavies Inn, Holborn Circus, London, E.C.)

In the "Royal Folding" reflex Messrs. Staley supply a box form of camera, the instrument being built practically on the model of an ordinary reflex. The ground glass is mounted in a solid metal frame hinged at the back of the camera. The act of turning the

milled head seen on the front in both drawings first extends the camera front and then brings up the ground glass into position, the metal frame being held all the way round against a metal rebate,

so that its position should be accurate and invariable. When closing the camera, a stud on the other side is pressed—when turning of the same head first drops the ground glass and closes the



extension. This same movement also racks out the frame carrying the mirror, which, in the closed position, is folded back close against and parallel with the blind of the shutter. The dimen-

sions of the quarter-plate camera when closed are just under $7\frac{1}{2} \times 7\frac{1}{2}$ ins by 5 ins thick The total extension is $10\frac{1}{4}$ ins from lens panel to plate, and the camera is provided with rise of front and spring lens screen, the whole front turning down to give access to the lens The hood can be detached, but in the ordinary way is a fixture with the frame of the ground glass, and disappears into the inside of the camera when the instrument is closed The focal-plane shutter is provided with outside adjustments for alteration of slit and spring tension, and works with great freedom from vibration both when giving time and instantaneous exposures The camera will take lenses of 6 ins focus and upwards, and the price complete with three double dark slides aluminium bound, but without lens, is £15

In the "Tropical" model of the "Royal" reflex camera noticed in a previous "Almanac" the woodwork is of teak, dove-tailed throughout, and the shutter is worked at a single tension speeds from 1-14 to 1 750 of a second being done by altering width of slit only, which is done from the o[illegible] The camera is fitted with mask for the focussing screen, showing automatically the adjustment of the rotating back to lan[illegible] ap[illegible] right, and is sold complete with three double slides, but without lens, at £15 5s in quarter plate size, £19 15s in 5 × 4 and £22 5s in postcard

THE "AGFA" POCKET FLASHLAMP

(Sold by Chas Zimmermann and Co, 9 and 10, St Mary at Hill, London, E C)

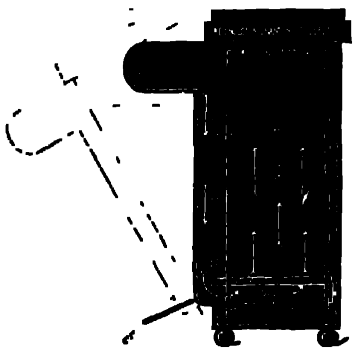
In this small flashlamp the makers have assuredly reached a point of convenience and efficacy beyond which it will be difficult to go The lamp consists of a pair of trays of nickelled metal, which are hinged together and fixed to a metal handle some 7 ins in length In one of the trays the necessary quantity of flash-powder is placed The novelty of the apparatus lies in the ingenious method of ignition This [illegible] by aid of a common Swedish safety-match, which is held by a spring clip, so that its bead comes in the semi-circular hole at the [illegible]k of the flash pan The head of the match is ignited by the upward passage against it of a strip of striking paper actuated by spring The match in turn ignites the powder which is placed on it, and as the ignition takes place at the back of the pile [illegible] powder and against the metal back of the lamp, the flash is forced away from the operator The actinic quality of the flash may be judged from the fact that at F 11, and using a plate about 200 H and D, the use of $1\frac{1}{2}$ gms of powder, say 20 grain gave a well exposed negative The lamp is not intended for big work by flash-powder but for single portraits and exposures consuming up to about 40 grains of powder it is capable of giving very excellent results Moreover, for architectural or similar technical work where it is desirable to use flash-light as an accessory means of illuminating extra dark corners, no more handy instrument than the "Agfa" lamp can be imagined

It folds up flat for the pocket, and is got ready for use in a few seconds Not the least notable feature of the lamp is its very moderate price, 1s 9d, complete, with fixing-papers and instructions

THE "RYSTOS" CONDUIT DEVELOPING TANK

(Made by Reynolds and Branson, Ltd, 14, Commercial Street, Leeds)

In this tank the makers have embodied an ingenious way of providing the very necessary movement of the developer From the upper part of the tank they build out a kind of well communicating



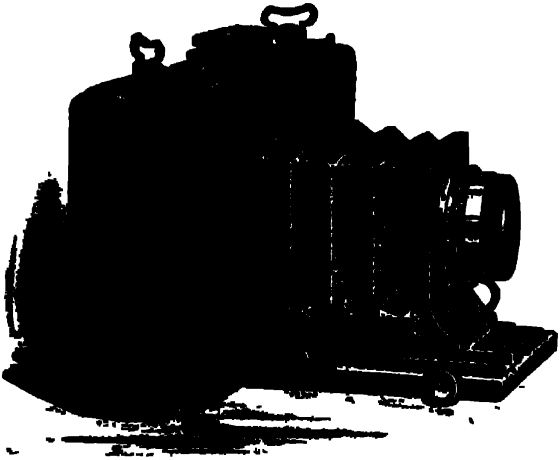
by a tube on the outside with the bottom of the receptacle Thus, when the tank is tilted into the outlined position, on the strut provided for the purpose, part of the solution flows over the well and comes round again at the bottom, so that an occasional transference of the tank from one position to the other during development ensures the absence of markings caused by quiescent developer The tank is very solidly made in copper, is fitted with rack and light-tight lid, and costs, in quarter-plate size for six plates, 9s, or for twelve plates, 12s It is made also in the $3\frac{1}{2}\times2\frac{1}{4}$, 5×4, post-card and half-plate sizes

THE No 1A "SPEED" KODAK

(Made by Kodak, Limited, 57 to 61, Clerkenwell Road, London, E C)

This quite new type of Kodak is of the folding pattern, but includes a focal plane shutter working very close to the sensitive film The "Graflex" multiple-slit type of shutter is adopted, the speed of the exposure being regulated by the width of slit selected, as well as by the spring tension The two together give a range from 1-10 to 1,000 of a second The shutter also allows of time

exposures In giving a succession of exposures of equal duration it is necessary only to re-wind the shutter to the same point with a half-turn of the key Direct-vision finder is provided with a mirror for use when holding the camera at a lower level, and the camera,



which takes $4\frac{1}{4} \times 2\frac{1}{2}$ pictures on the Kodak roll film, is beautifully made with all the fittings in oxidised metal and covering of seal-grain leather The price, without lens, is £8 with Goerz "Dagor" f/6 8 £15, or with Beck "Isostigmar" f/5 8 £10 12s

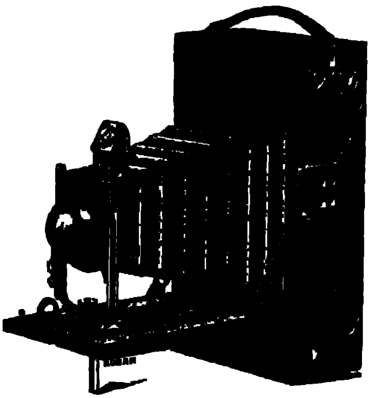
THE 4A "SPEED" (FOCAL-PLANE) KODAK

(Made by Kodak, Limited, 57 to 61, Clerkenwell Road, London, E C)

This instrument takes a picture $6\frac{1}{2} \times 4\frac{1}{4}$ inches, that is to say, it takes the Kodak daylight-loading spool of $4\frac{1}{4}$ inches of 6 or 4 exposures As regards portability, the total outside bulk of the camera encloses both the roll-holder and the focal plane shutter, but is very little bigger than would be either of these articles separate Folded for carrying, the camera measures just under $12 \times 7 \times 3\frac{1}{2}$ inches Extended, it allows of the lens panel being placed about $11\frac{1}{2}$ inches from the sensitive film It will thus be seen that much success has attended the endeavour of the makers to provide a camera suitable for the most rapid exposures with a comparatively small bulk

As regards the shutter itself, it is naturally of the self-capping type—any other would be useless for a film camera—with a single slit the width of which is very readily altered An adjustable scale is provided with a pointer on the side of the camera The pointer has only to be moved from one graduation into the next—it snaps at each point—to give a series of slit widths of $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1, $1\frac{1}{2}$, and 3

inches, in addition to a much longer aperture the full height of the picture, or 6¼ inches, which is available only for time exposures While the alteration in the width of slit is best made before the shutter is set, the other factor in obtaining the full range of speeds, the spring tension of the shutter, may be altered whilst the instrument is held ready for exposure with the shutter set A complete turn of the winding key increases the tension one number, whilst two pressures on a lever automatically relax the tension to the same amount The latter movement is an especially neat and convenient method of releasing the tension, far superior to that in the generality of shutters where one has to press the release with one finger and let down the tension-key with the thumb and finger of the other hand The clutch release in the "Speed" Kodak allows of all this being conveniently done with one finger The milled key provides a rapid wind of the shutter, whilst release is made by raising the plate provided with a small milled



knob, which is fitted with a spring, so that it must be intentionally raised to release the shutter The adjustment for both time and instantaneous exposures are thus most conveniently made, whilst the conjunction of spring tension and slit width allows of exposures being given from 1/5 to 1/1000 sec., whilst with one single slit width—say 1¾ inches—a series of exposures from 1/10 to 1/70 may be given by altering only the tension One point which we think is worthy of special mention is the closeness with which the blind of the shutter works to the plate or film The distance in the case of the roll-film must be less than ⅛ inch, a point which deserves to be emphasised, since it is not unusual to find the efficiency of focal-plane shutters depreciated owing to their being mounted at some quite considerable distance from the true focal plane

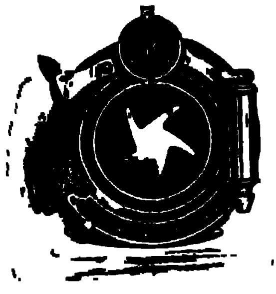
In the way of other movements the camera is very well provided It is fitted with direct-vision finder for pictures landscape way, the sighting point and lens of the finder both folding back by one move-

ment flat with its metal carrier The lens front also carries a reversible brilliant finder, and is itself provided with screw rise and front movement The front of the camera is brought forward and fixed in any point by the clamps seen in the illustration, a fine focussing movement thus serving for single adjustment of the pointer on the scale Mention should also be made of the light-tight air vent provided in the front of the bellows, by means of which drawing in of the blind of the shutter or the bellows is entirely obviated Externally free from projections, except the one or two very solidly made keys on the left hand side, the camera is eminently fitted for the tourist, whilst its workmanship throughout is of a high mechanical quality, worthy of the Kodak reputation The price of the No 4a "Speed," without lens, is £10 10s To it can be fitted any one of a number of high-class anastigmats of focus about 200 mm (about 8 inches) These include the Zeiss "Tessar," the Beck "Isostigmar," the Goerz Series III, and Goerz "Celor" f/4 8 The camera can also be fitted with a plate adapter focussing screen and one double plate holder, at a cost of £1 10s

THE KODAK "BALL BEARING" SHUTTER

(Made by Kodak, Limited, 57 to 61, Clerkenwell Road, London, E C)

This new shutter, which is now fitted to all the No 3, 3a, and 4 "F P K" cameras, represents a new pattern of shutter, the leaves being made in five segments, mounted on ball-bearings, and opening in the shape of a star, an arrangement which gives a high efficiency The exposure, both for time, bulb, and the three adjustable speeds of 1 25, 1 50, and 1 100 secs, is given either by trigger or pneumatic

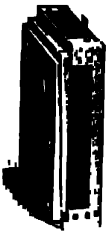


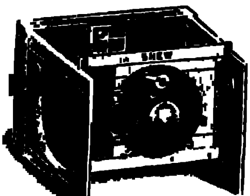
release, and with the extreme of smoothness and silence Moreover, the shutter is fitted with an automatic counter recording, up to a total of twelve, the number of the exposures This counter can be brought back again to No 1 in an instant by means of the little ratchet wheel attached to it The automatic record thus made of each exposure should be a further convenience to the user of roll-film, whilst the construction of the shutter impresses us by its freedom from mechanical complications

THE "EUXIT" POCKET CAMERA

(Made by J F Shew and Co, 88, Newman Street, Oxford Street, London, W)

Pronounced "Use It" in reference to its response to all kinds of practical requirements, this new pocket camera is an addition to the large family of "Xit" cameras made for many years past by Messrs Shew, and rightly esteemed for their working qualities The "Euxit" embodies the same system of side flaps employed in other models of the "Xit" cameras It is made to take a plate $3\frac{1}{2} \times 2\frac{1}{2}$ ins, being fitted with a Cooke focussing lens of 4.4 inches focal length mounted in the well known "Compound" shutter. The lens mount thus provides the necessary focussing for objects within 9 feet of the camera, and the lens itself affords a rise of one inch the landscape way of the plate, together with a cross front movement which is available as rise when the camera is held the upright way of the plate The finder is of the "Iconometer" type, a sliding rod being used in conjunction with a wire frame on the lens front This very simple device has the further advantage that the frame moves up along with the lens and therefore gives some idea of the amount of picture included on the plate, provided that care is taken to hold the camera level The "Euxit" is fitted with focussing screen which instantly clamps into the back of the camera, and with six single metal dark-slides which are similarly placed quickly in position The apparatus is very strongly made in mahogany, aluminium bound, and is an actual pocket instrument, the total dimensions of the camera with dark-slide ready for exposure being $4\frac{3}{8} \times 3\frac{3}{8} \times 1$ 3-5 ins The price complete with the Cooke lens, series III $f/6.5$, and with purse for the six metal slides, is £9 9s In quarter plate size and with Cooke lens of 5-in focus the price is £11 11s The instrument is strongly made, and may be recommended for withstanding a great deal of hard usage It should be added that it is fitted with bushes for attachment to a tripod





THE ROSS NEW MODEL ARC-LAMP

(Made by Ross, Limited, 3, North Side, Clapham Common, S W)

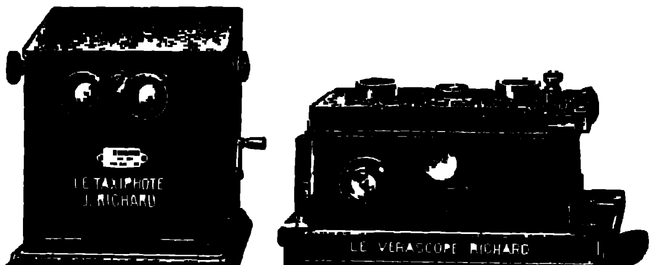
Many people who associate the name of Ross only with the manufacture of high grade optical instruments may not perhaps be aware of the many mechanical instruments other than optical made in the Clapham factories The new model of arc-lamp just intro-

duced is mechanically a beautiful piece of work, whilst its technical qualities are those which should appeal very strongly to the lanternist and enlarger The lamp is made throughout in brass, the carbons amply insulated, and very nice adjustment provided for raising and lowering the arc as a whole, adjusting the separation between the carbons, and for moving the upper carbon to and fro In addition to this the lamp allows of a sideway adjustment of the light, all the movements working with excellent freedom from back lash so that the light is very rapidly manipulated in use The lamp can be detached from its own base and transferred to a lantern tray of the ordinary type, it being thus suitable for use in any make of lantern

THE NEW MODEL "TAXIPHOTE"

(Made by Jules Richard, 23, Albemarle Street, Piccadilly London, W)

Since we reviewed the universal model of the "Taxiphote," serving not only as a viewing instrument for stereo Verascope transparencies, but also for projection and printing purposes, this simplified model of the apparatus has been placed on the market. It accommodates twenty five Verascope stereo transparencies which are brought up one by one before the pair of viewing lenses simply by turning the handle seen on the right in the illustration In this way the observer can look at the whole series without taking his eyes from the instrument The "Taxiphote," however, allows of



any one transparency being picked out and raised for observation on first turning a pointer on the left of the cabinet to the number required The instrument is provided with adjustment for the separation of the eye pieces and with focussing movement Complete with lock and key for the cabinet and one storage box holding 25 positives the price is £7 5s , or without adjustable separation of the eye pieces £6 6s

Mention may also be made of the latest model of the "Verascope" camera itself to which Zeiss "Tessar" lenses of $f/4.5$ aperture are now fitted, as is also a new type of shutter giving instantaneous exposures from $\frac{1}{8}$ to 1-150 sec in addition to "time" The makers

issue a speed card for each camera, giving the actual speeds which have been found for that particular shutter The "Verascope" may also be fitted with an adapter to take the daylight loading film pack

"COOKE" SERIES IIA f/3.5 PORTRAIT LENS

(Made by Taylor, Taylor, and Hobson, Limited, Stoughton Street, Leicester)

This new addition to the series of "Cooke" lenses applies the well-known construction adopted in these objectives to the production of a portrait lens of the very highest aperture—namely, f/3.5 The lens is made only in one focal length - namely, 12 ins - intended for making cabinet portraits, and at full aperture it covers the half-plate perfectly A lens of this large aperture and focal length is necessarily of considerable size, the glass being nearly 3½ ins in diameter, and the outside diameter of the flange measuring 5¼ ins The lens is supplied with iris diaphragm whilst the front portion is capable of being separated from the back elements so as to give a certain amount of diffusion, the makers providing an automatic stop when reverting to the sharpest possible definition The price of this new "Cooke" is £18

"THE MERITO" DEVELOPING DISH

(Sold by W L Parkinson, Limited 5, Commutation Row, Liverpool)

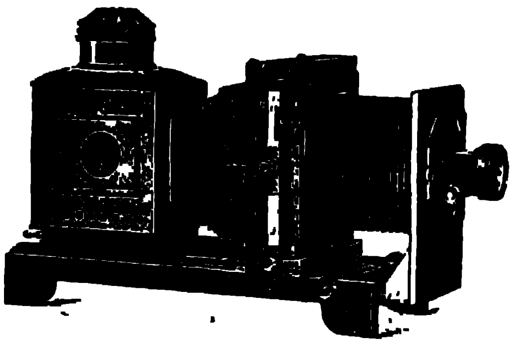
Still another variant of the numerous types of developing dish, but one which has much to recommend it from a practical point of view, is the pattern just introduced by Messrs Parkinson at the prices of 7d in quarter plate size and 1s in half-plate The dish is provided with two ribs on its lower side about half an inch apart, so that whilst it stands quite level on these a gentle rocking motion can be given to it simply by touching either end of the dish The dish is also provided with two circular depressions at opposite corners of the inside, serving to facilitate the raising of the plate with the fingers The material is a china of very fine structure and enamel surface

THE No 6 AND "POPULAR" ENLARGING LANTERNS

(Made by the Midland Camera Company, Slaney Street, Birmingham)

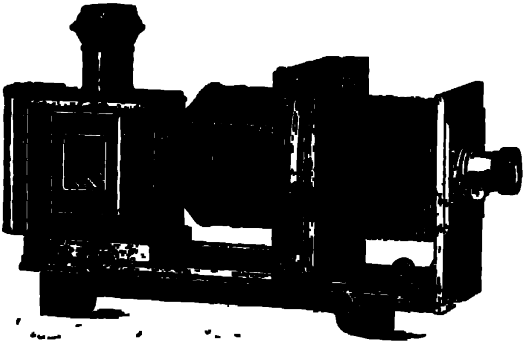
We could fill several pages of these notices with descriptions of the many patterns of enlarger made by the Midland Camera Co, who have specialised with great success in this type of apparatus, of which they make no less than nine distinct models representing a series of thirty-four different enlargers We select two models, the "No 6"—perhaps the most popular all round type—whilst the "Popular" or "No 3" is a less expensive pattern, which nevertheless is remarkable value for the price charged for it In the No 6 the first point to be specially commended is the universal

negative carrier-frame A rack and pinion adjustment at the foot gives the negative a tilt across the axis of the lens, so that lines which are "out" in the negative due to the camera having been tilted at the time of making the exposure may be corrected, such tilt of the negative being absolutely necessary in addition to an equal tilt of the enlarging easel We mention this, as the contrary is often stated, but omission to tilt the negative leads to a disagreeable "squat" distortion in the enlargement In addition to this the frame allows of three other rack and pinion movements being given to the negative—namely vertically up and down, sideways, and rotary, so that the correct adjustment of the picture on the enlarging easel is most easily and rapidly done, particularly as all three heads of these pinions are placed together in a bunch, although each is quite separate in its action from the other two Indicators are provided so that it is seen when the negative is centrally placed as regards any of these movements, and the



carrier as a whole snaps centrally into the stage from whichever side of the enlarger it is inserted Further, mention should be made of the spring adjustment by which the negative is inserted in the carrier A pair of springs press the film side into register with the top plate, so that when focussing has once been made for a given scale of enlargement every subsequent exposure will be in sharp focus owing to the film being in correct register, while at the same time the negatives may if desired, be quickly taken in and out by removing the bellows instead of by taking out the carrier In other respects the enlarger is conveniently arranged, the focussing heads are placed on each side so that the operator can work just as well on one side as the other The lantern has also a screw adjustment from the back, the bellows are detachable, and the whole apparatus very excellently made in oak at a price in quarter-plate size, with 5½-in condenser, for £5 10s, without lens, in half-plate, with 8½-in condenser, for £8 10s.

In the "No. 3" pattern the lantern has rack and pinion adjustment, as also the central tilt for the correction of distortion, whilst there is also provided sufficient extension to allow of reduction to lantern size, a convenience which enlarges the scope of the

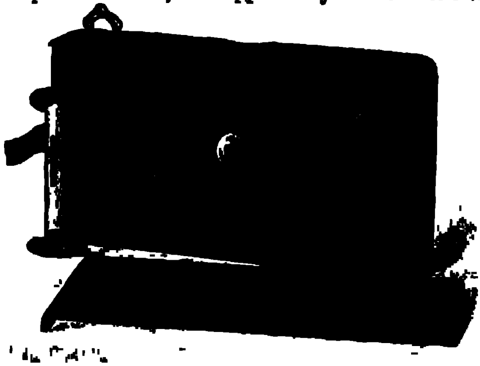


apparatus As before, there are automatic indicators for showing the degree of swing or tilt, and the apparatus costs, in quarter-plate size with 5½-in condenser, £3 5s without lens, in half-plate size £5 15s

THE "PARVEX" FOLDING FILM CAMERA.

(Sold by the London Stereoscopic Company, Ltd, 106 and 108, Regent Street, London, W)

A very portable pocket film camera, specially manufactured for use in tropical climates, is supplied by the London Stereoscopic



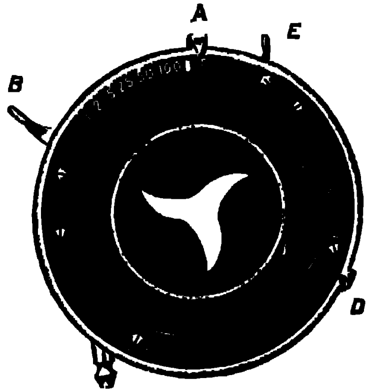
Company under this name. The body is made of special hard black pearwood, the metal bed of the camera and the sides being all

in one piece The edges of this metal plate are locked into the body, so that a very solid construction is secured and the film is most efficiently protected from damp whilst in the camera The "Parvex" takes a picture of 3¼ × 2¼, employing a 2¼ film spool It is fitted with a nickelled lazy-tongs extension for the front, and carries an instantaneous shutter, the working parts of which are enclosed Time, bulb, and instantaneous exposures are very readily given, the latter being set simply by turning the milled screw above the lens The camera is also fitted with sunk brilliant finders for upright and horizontal pictures, in addition to a direct-vision finder, of advantage when making an exposure at the level of the eye Throughout the makers have very fully considered resistance to the wear and tear inevitable when a camera is used abroad, the bellows, for example, being made of Russian leather, secured not by any cement, but by metal plates at each end The camera is usually fitted with a "Cooke" focussing lens, and thus allows of being set to various distances, but, depth of focus in an *f*/6 lens of 4 in focus being so considerable, actual focussing may in most cases be dispensed with The "Parvex" is sent out ready for use in a stout leather sling case, with lock and key and carrying strap

THE NEW MODEL (1909) "AUTOMAT" SHUTTER

(Made by the Bausch and Lomb Optical Company, 19, Thavies Inn, Holborn Circus, London, E C)

In this new model of the universally used "Automat" shutter the working parts are most thoroughly enclosed and the adjustment of the shutter rendered as simple as would appear possible



As shown in the drawing, B is the release lever, serving for both instantaneous, bulb, and time exposures, whilst C is the connection for pneumatic or "Antinous" release E is a locking lever, shown

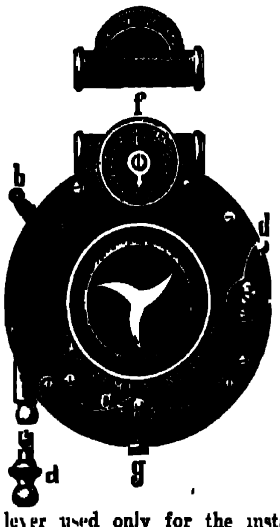
in the drawing released, but, when depressed, serving to bolt the shutter, so that accidental exposure by pressure on the ball when closing the camera or by strangers tampering with the apparatus is obviated. The sliding pointer A serves to alter the adjustment of the shutter from time to bulb and thence through the series of exposures marked on the scale. The remaining adjustment, that of the diaphragm aperture, is provided by the pointer D, the scale on the lower rim of the shutter being left blank for the engraving of the diaphragm numbers. The price of the shutter in its latest form for quarter-plate and 5×4 cameras is 21s.

As regards the marking of speeds on the shutter the Bausch and Lomb Co. in their circular state that "the maximum speed is between the 1-50th to 1-60th of a second, and is the quickest of any shutters at present offered in competition. We continue to mark the speeds from 1 to 1-100 second, as is the custom of the trade, and must continue to do so until the public realise that none of the cheap shutters will give this speed, when we will gladly adopt our own system of marking actual speeds."

THE "COMPOUND" SHUTTER (NEW MODEL).

(Sold by A. E. Staley and Co., 19, Thavies Inn, Holborn Circus, London, E.C.)

In the latest pattern of this most perfect of diaphragm shutter the setting of the shutter to bulb or time automatically



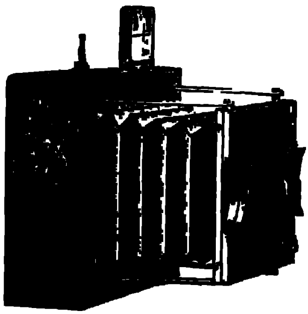
locks the setting lever used only for the instantaneous speeds, leaving simply the release free. This latter works very nicely indeed both for bulb and time. On setting the adjusting knob to "instantaneous," the setting lever is then brought into action.

The shutter in this form is as convenient as can be made, and its high efficiency, even at the top speeds makes it a piece of apparatus on which the hand camera worker may depend for the fullest degree of exposure The prices of the "Compound" in its latest form remain the same

THE TROPICAL "PANROS" FOLDING FOCAL-PLANE CAMERA

(Made by Ross, Limited, 3, North Side, Clapham Common, London, S W)

The ordinary model of this folding camera, fitted with the very convenient focal plane shutter reviewed in last year's "Almanac," is now obtainable as a tropical pattern, constructed of teak and costing, complete with Homocentric lens f/6 3, three double dark slides, and leather case £16 17s 6d in quarter plate size, £18 10s in 5 × 4, and £19 15s in postcard size As in the



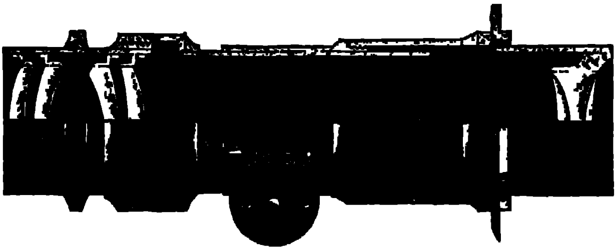
ordinary model, the shutter is self capping, of rapid work with the highly convenient adjustment of speed simply by turning the inner key seen in the drawing, and, finally, similarly quick movements for "time" and "bulb" exposures and for focussing on the ground glass The ordinary model of the "Panros" is now made in postcard size Price, with f/6 3 "Homocentric" of 6½ focus, three double backs, and black leather case £14 10s

"ROSS" TELEPHOTO ATTACHMENTS

(Made by Ross, Limited 3, North Side, Clapham Common, London)

This is a very perfectly finished telephoto lens mount, the one submitted to us being fitted with 7 inch Homocentric positive of f/6 3 aperture, and two negatives of 3 and 2¼ inches focus respectively These settings are made in several sizes, to suit various positive and negative lenses, and are fitted with focussing rack and pinion and a scale showing the separation of the optical elements, while another scale is engraved on the complete instrument to show

the approximate magnification. The complete objective is less bulky than many telephoto combinations of the ordinary type, and is highly convenient in use. The mechanical perfection of the mountings calls for special commendation. Any first-class ana-



stigmat can be used as the positive element, the Homocentric being specially recommended. The prices of the settings vary from £2 10s. to £5 5s., while the negative elements cost from £1 15s. to £7 15s. Thus the Ross series provides for the use of tele-negatives from 1½ to 5 ins. focus.

THE "CHALLENGE" CELTIC HAND CAMERA

(Made by J. Lizars, 101 and 107, Buchanan Street, Glasgow.)

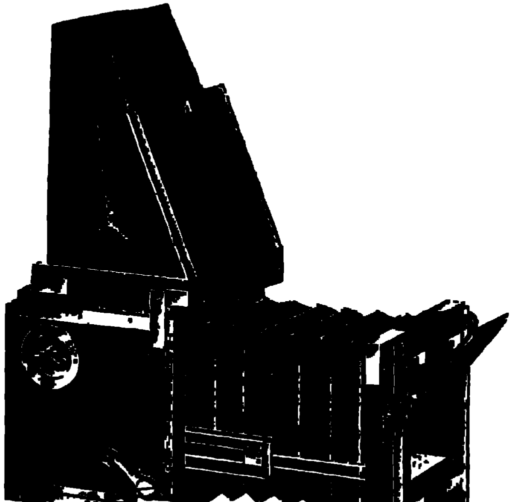
This new model of the "Challenge" series is a highly portable camera, fitted with adapter (which is a fixture) for the envelope daylight-changing system. Although a double extension instrument giving over 9 ins. from lens to plate, the outside dimensions of the camera when closed are under 2½ × 5¼ × 4½ ins. The camera front pulls out automatically into focus on infinity, and is then racked out direct to the full extension. The front is also provided with large rise and cross-front movement, and carries a Beck R.R. lens mounted in the "Ibso" or Bausch and Lomb automatic shutter. The ground glass and a very deep and efficient focussing hood being included in the camera, the instrument has the virtue of freedom from all loose parts, and is, moreover, excellently made in mahogany with brass fittings. The price is £3 12s. 6d.

THE "FALLOWFLEX" REFLEX CAMERA

(Sold by J. Fallowfield, 146, Charing Cross Road, London, W.)

This camera is fitted with the Whitehead or "Pyket" focal plane shutter reviewed in last year's "Almanac," its characteristic feature being the very rapid wind and adjustment to the series of slit widths. The winding key both sets the shutter and serves for the adjustment of the width of the blind, and this by a very rapid movement. Also the shutter is self capping, and the plate is thus doubly safeguarded from light—by the blind and the mirror, which latter automatically falls after each exposure. The camera is well

provided as regards extension, which is nearly 12 ins in the quarter-plate size, whilst, on the other hand, the "dodging" movement of the mirror allows of a lens as short in focus as 4½ ins being employed The rise of front is a full inch, and is fitted with rack and pinion, whilst the front also carries lens-shade, serving also as a cap for time exposures The hood erects itself on raising the lid of the camera whilst the frame of the hood is hinged, and gives



access immediately to the mirror The rotating back may be said to complete the list of good features of the "Fallowflex," which is very strongly made and well finished in black ebonised wood and black grain covering The price of the ordinary model, complete with 3 slides, is £9 9s At the above very moderate price the "Fallowflex" certainly takes a place by itself among reflex cameras A tropical model in teak, brass bound is also made

THE WATKINS DAYLIGHT TIME TANK

(Made by the Watkins Meter Company, Hereford)

Several new and commendable features are embodied in this piece of apparatus These apply quite as forcibly when the tank is employed for development by inspection of the negatives instead of when the instrument is used for the specific purpose for which it is made —namely, development by time only In the first place, the

rack, which holds a dozen plates, is made one with the cover of the tank, the racking being mounted in it so that the plates are held horizontally, not vertically, in the solution. The advantage of this arrangement is that when only one or two plates are to be developed they may be placed in the lower grooves, and thus a small quantity of developer only is needed. The delivery piece of the tank which projects from one end serves not only for admission and discharge of the developer, but also accommodates a thermometer which serves to check the temperature of the solution. The tank is very substantially made,

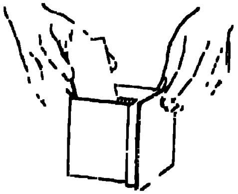


Fig 1

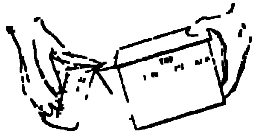


Fig 2

and, if care is taken to rinse it out and set it to drain after each time of use, will last for a long time, but it should not be forgotten that, like any other metal dish, if allowed to stand in a damp place, where any last traces of water will not dry up in it, its life will be considerably shortened. The arrangements of the rack make it very easy, we find, to load plates into it even in the dark, the edge of the empty rack, and afterwards the edge of each plate serving as a guide for the insertion of the next. The price of the tank in the quarter plate size is 6s., it is also made in the half plate size, holding 36 ozs. of developer.

THE "MOTO" DARK-ROOM LAMP

(Sold by W. Butcher and Sons, Limited, Camera House, Farringdon Avenue, London, E.C.)

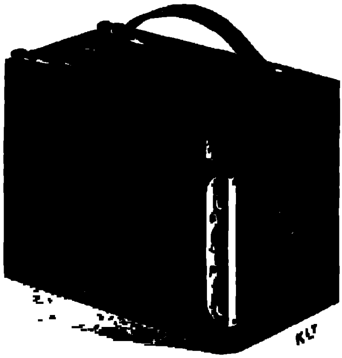
This new pattern of dark-room lamp, very strongly built, somewhat on the design of a motor-car lamp, is made entirely of metal, the reservoir, which carries a good size burner, being outside, and the lamp being provided with two circular safelights (ruby and amber) 3½ inches in diameter, either or both of which may be used. One good feature of the lamp is the large handle, enabling it to be conveniently carried about the dark-room.

NEW "PREMO" CAMERAS

(Made by Kodak, Limited, 57 to 61 Clerkenwell Road, London, E.C.)

Of the series of cameras taking the all-convenient "Premo" film-pack, a new size and pattern is the "Premo Junior" for pictures 3¼ × 2¼ ins., a neat box camera measuring 5¾ × 4¼ × 3¼ ins., of fixed focus type with everset shutter for time and one instan-

taneous speed, three diaphragms, two sunk ground-glass finders, and sockets for the tripod screw The price is 12s 6d



New folding cameras for the "Premo" film pack are the Nos 1A "Ordinary" and "Special" "Premoettes." The "Special" takes a picture $4\frac{1}{4} \times 2\frac{1}{2}$, is fitted with scale focussing, R R lens with iris diaphragm and everset shutter fitted to work at time, bulb, and one instantaneous speed, and with trigger and pneumatic release It carries also reversible hooded brilliant finder and tripod bushes The price is 52s 6d The "Ordinary" pattern is similar in design to the "Special," but is fitted with a single lens, and ground-glass finder The price in this case is 25s All three cameras are excellently and strongly made, and are capital instruments to put in the hands of a beginner

NEW "BROWNIE" KODAKS

(Made by Kodak, Limited, 57 to 61, Clerkenwell Road, London, E C)

In the No 3 "Brownie" Kodak, a fixed focus box hand camera of quarter-plate size for roll-film only, the lens is fitted with ever set shutter for time and instantaneous exposures the former obtained by pulling up the small nickelled lever on the front Three diaphragms are provided, there is ground-glass finder each way of the plate, and the camera also carries two stout bushes for attachment to the tripod Covered in leatherette, with all fittings nickled, the price of the camera is 17s 6d

Two new folding "Brownies," Nos 3 and 3A, also for roll-film, are introduced as new models, both fitted with the Kodak automatic shutter, with time, bulb, and one instantaneous speed, and with the very convenient and practical automatic focussing lock by which the camera can be set to any point on the focussing scale from 6 ft to infinity, the front then locking at the set point on being pulled out on its runners Each camera is fitted with reversible ground-glass finder and two tripod sockets The price of the No 3,

taking quarter-plate pictures, is 37s 6d, or with R R lens, 46s The No. 3A, which is postcard size, is priced at £2 2s, or £2 10s with R R lens

Both cameras when closed for carrying are of very convenient slim dimensions, and both in every detail are of the characteristic excellent Eastman workmanship

THE DALLMEYER TRIPOD SUPPORT

Made by J H Dallmeyer Limited 25, Newman Street, Oxford Street, London, W

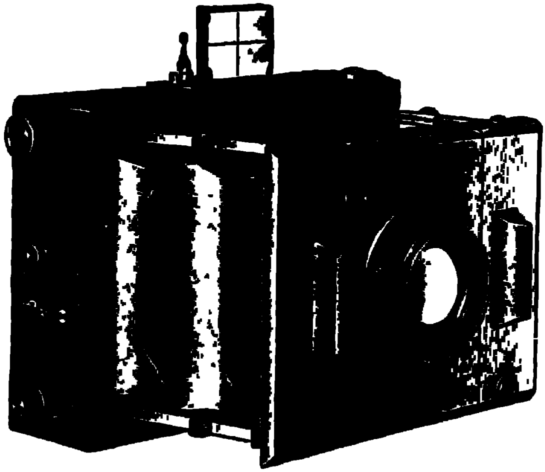
An accessory for the service of the architectural photographer is issued under this name by Messrs Dallmeyer and takes the form of the old device of three radiating struts on which the points of the tripod can be placed thus preventing the legs from slipping, as they otherwise would, on a stone or polished wood floor The particular virtue of the present accessory lies in the extra portability given to it by dispensing entirely with a centre piece for the struts, hinging them together direct, so that when spread out and bolted at the centre they form a three way support for the tripod Thus when folded the whole accessory measures over all only 25 x 2¾ ½ ins, and can thus be strapped up with the photographer's ordinary tripod without appreciably increasing the bulk of the latter For architectural work this little accessory, which costs 7s 6d, should be a valuable addition to the photographer's kit

BUSCH FOLDING FOCAL-PLANE CAMERAS

(Made by the Emil Busch Optical Company, 35, Charles Street, Hatton Garden, London, E C)

Two new models of the convenient folding focal plane camera have been placed on the market by the Busch Co, the first the "Planor," being a further improvement of the camera hitherto marketed under that name The lens board is most rigidly supported by four stout metal struts, each hinged half way between front and back and giving the highest degree of rigidity to the front board The camera is very easily and quickly collapsed

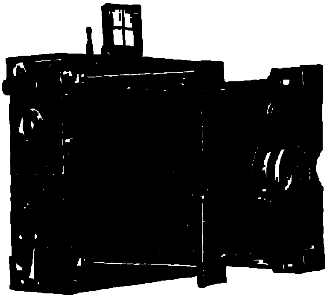
by simple pressure on the hinges It is quickly opened simply by pulling out the pair of clips seen on either side of the lens in the drawing The camera is fitted with two-way rising front, giving both a rise and fall of 1 in the vertical way of the plate in addition to rise and fall the landscape way of the plates The shutter is very simple and rapid in its manipulation, the slit being adjusted by winding the blind until the upper part of the aperture is level with the top of the plate, when pressure of a knob on the left of the camera allows of the slit being enlarged or contracted by winding a small head on the right just above the winding key The adjustment for alteration of tension is provided in the usual way, the two in conjunction giving speeds up to 1-1,000 sec Time exposures are very



simply obtained by opening the slit to the full width of the plate, when pressure on the release opens the shutter and a second pressure closes it Mention should also be made of the brake attachment for the shutter, convenient at times for still further slowing down the slowest speeds given by the shutter In several points the details of construction make for convenience For example, the catch for the dark-slide or focussing screen is operated by pressing down the lever instead of raising it, an improvement which, although of minor importance, nevertheless conduces to smoothness of working The camera is provided with strong bushes for adjustment to the tripod, and complete with three excellent double plate-holders with pull out shutters and Busch "Detective" Aplanat the price is £8 10s 6d With "Omnar" anastigmat, Series III, No 2B, the price is £9 10s The camera can also be adapted to carry the

"Premo" film-pack at the price of 12s., whilst extra double plate-holders are obtainable at 10s. each.

The "Heda" is a still cheaper variety of the camera sold at the low price, complete with three single metal slides and Busch Aplanat *f*/8, of £5 7s. 6d. The extension in this case is provided by four metal rods, and certainly gives a very rigid front board. Rise and fall of front are provided the vertical way of the plate, whilst the lens-board is further made rotatable, so that the rise and fall can be obtained either way of the plate. The shutter, with the exception



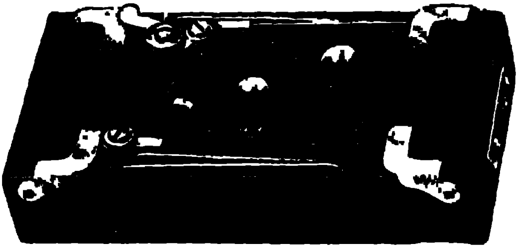
of the brake attachment, is the same as that fitted to the "Planor." Adjustments of the width of the slit and for time exposures are made as with the "Planor," and the "Heda," like the "Planor," is also fitted with direct-vision finder. The cameras, both of which are listed at present only in the quarter-plate size, are most efficient instruments of their type, and may be recommended for the many descriptions of hand-camera photography, particularly that of rapidly moving objects.

THE "ENSIGNETTE" VEST-POCKET FOLDING CAMERA.

(Made by Houghtons, Limited, 88 and 89, High Holborn, London, W.C.)

A complete self-contained roll-film camera which measures under 4 × 2 ins. and is scarcely more than ¾ in. in thickness is what Messrs. Houghtons have achieved in this instrument, which, fitted with a single lens, is issued at the moderate price of 30s. The camera takes a picture 2¼ × 1½, the roll-holder accommodating a spool of six exposures. The little instrument is fitted with a time and instantaneous shutter, a brilliant view-finder, and a rotating diaphragm plate, giving the apertures *f*/11, *f*/16, and *f*/22. Although designed primarily for use in the hand—the short focal length of the lens dispenses with the need of focussing and allows of objects up to 7 ft. distant being photographed—the camera can be stood on a flat surface, both for vertical pictures or those landscape way of the plate, for which latter purpose a small folding leg is attached. The instrument is made throughout in metal, and is strongly though lightly constructed. While it is a perfectly practical instrument, giving negatives which will stand a considerable degree of enlarge-

ment, the astonishing fact remains that it can be carried without inconvenience in the upper waistcoat pocket, in connection with which fact it must be remembered that it is a complete instrument, and has only to be opened out on its nickelled struts to be ready for

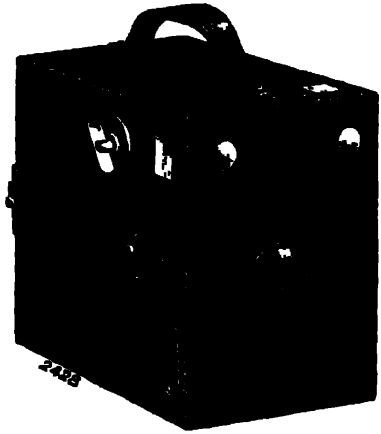


taking a picture The camera may also be had with an "Ensign" anastigmat lens working at $f/5$ 6 for 70s, whilst a fixed focus enlarger, giving a postcard picture from the "Ensignette" negative, is supplied for 5s 6d

"ENSIGN" BOX-FORM FILM CAMERAS

(Made by Houghtons, Limited, 88 and 89, High Holborn, London, W C)

A new series of the convenient and saleable box-form of film camera has been designed and placed on the market by Messrs



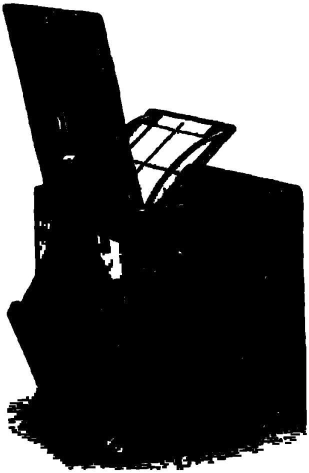
Houghtons to provide a series of cameras which, from first to last, is of substantial British make These box form "Ensigns" are

made in three sizes—the 2¼ A for pictures 2¼ × 2¼ ins., the 2¼ B for pictures 3¼ × 2½ ins., and the 2½ for pictures 4¼ × 2½ ins., whilst there is also a quarter-plate size The cameras are very substantially built of hard wood, the film-holding chamber being removable from the side of the camera, thus providing easy access for reloading, but being firmly locked by a spring and two separate catches The fittings include a single achromatic lens, "everset" shutter, giving time and instantaneous exposures, two ground-glass view-finders, and leather handle for carrying The 2¼ B and the 2½ sizes are further provided with adjustable diaphragm plates, giving apertures from *f*/11 to *f*/32 The substantial make and good appearance of the instruments are quite what one would expect from camera makers of the experience of Messrs Houghtons, and the new series should find purchasers in all parts of the globe, both for the cameras and for the "Ensign" film used in them The prices of the three sizes named above are 5s., 10s., and 12s. 6d

THE "MIRAL" DISAPPEARING MIRROR REFLEX CAMERA

(Sold by Fred V. A. Lloyd, Limited, 15, Lord Street, Liverpool.)

This model of the "Miral" sem[illegible] reflex cameras made by Talbot and Eamer Mirals, Limited, [illegible]e special feature particularly recommending it for sports a[illegible]ther branches of press



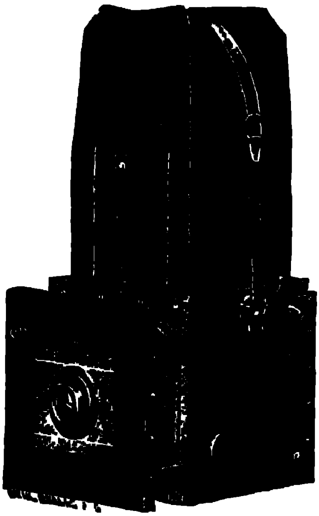
photography in which there is rapid motion By turning a pointer on the right of the camera to "T," and setting mirror and shutter in the usual way for a rapid exposure, the object may be watched on the focussing screen to a point just a little short of what is

required in the negative before pressing on the release lever With the camera adjusted as just described, pressure on the release allows the mirror to move up, but the shutter is not released until the finger is taken off the lever The movement thus enables the photographer to follow instantaneously with his exposure the action of the subject, which latter at the final instant he views direct This is quite in accord with the best practice of press photographers, and is certainly a most useful movement In other respects this model of reflex is well provided with ample rise of front, lens-shade, rotating back, accessible focussing screen and mirror, and focal-plane shutter very readily adjusted to the various speeds, and for time exposures It is fitted with level in a convenient position, and is of thoroughly good workmanship It is supplied with Goerz anastigmat, *f*/6 8 aperture, and three double dark slides at £16 15s

THE "BUSCH" REFLEX CAMERA

(Made by the Emil Busch Optical Company, 35, Charles Street, Hatton Garden, London, E C)

To the large series of hand cameras included among the manufactures of the Emil Busch Optical Company must now be added an instrument of the reflex type In its general construction the



"Busch" reflex resembles the type of instrument which has been evolved during the last year or two—namely, one to which most of the cameras on the market more or less closely conform It has, however, one or two special features In the first place the panel

carrying the lens is of unusual size—namely, 3½ ins square—and therefore able to carry lenses of the largest aperture, or even a lens of the portrait type The panel is made so that it may be reversed in its setting, and the front of the camera has considerable rise and fall movement, a total range of over an inch in the 3½ by 2½ size, which is distributed partly as rise and partly as fall It is evident that the carrying of a large lens is particularly kept in view by the makers, since the extension struts of the camera are four in number, very rigidly made, and hold the lens front very firmly The focussing pinion is placed on the left-hand side of the camera, whilst on the right a clamping head is provided, so that, if necessary, the camera may be fixed at a focus for any given distance The hood is built square, and gives a perfectly unobstructed view of the corners of the plate The frame to which it is fixed is hinged on the front side, and is instantly turned back, giving access to the ground glass, which latter can also be turned up to allow of the mirror being dusted The mirror itself is depressed by pressure on the lever seen in the top right hand corner of the camera in the drawing, but is protected by a guard (not shown in the illustration), serving to prevent accidental damage The shutter release is actuated by a similar lever on the right-hand side of the camera, the release of the mirror and shutter being extremely free from vibration The focal-plane shutter is that noticed elsewhere under the Busch Planox focal-plane camera The camera is also provided with the indispensable rotating back, which snaps into each position In workmanship the camera is altogether excellent being finished throughout in black ebonised wood, covered in black leather, and having all the metal parts also of black finish The camera is made in three sizes only--namely, 3½ by 2½, 4¼ by 3¼, and 5½ by 3½ (post-card) In the quarter plate size the price, complete with three plate holders and Busch "Aplanat," f/6 5, is £13 10s , or with Busch "Omnar," f/4 5, £17 8s In the 3½ by 2½ size these prices are £12 and £15, whilst in postcard the price, with f/4 5 "Omnar," is £21 10s The cameras allow of extensions of 8, 10¾, and 12¾ ins respectively, in the three sizes, and, therefore, while allowing of quite a narrow angle of picture, such as that given by the single combination of the lens, are eminently suited for use with the well known "Bis Telar" telephoto lens The instruments are also applicable for use with the "Premo" film-packs

MOTORS FOR AEROGRAPHS

(Made by the Aerograph Company, Limited, 43, Holborn Viaduct, London, E C

Constant air pressure being an important condition in the commercial use of the Aerograph, both for photographic and process purposes, the two forms of apparatus specially supplied for this purpose become a valuable part of the equipment For those who have electric supply the best form of apparatus is the Motor Air-pump supplied, of 1 6 and ¼ horse-power, the former at £15 15s , and the latter at £12 12s , in each case suitable for 100 or 200 volt circuit, and allowing of the current being taken from an ordinary electric light fitting The pump worked by the motor is most ingeniously provided with an automatic valve release, which keeps

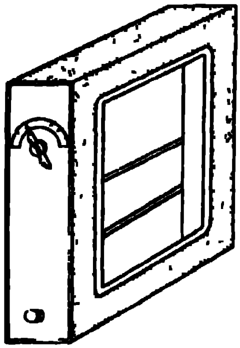
the pressure constant at anything up to 40 lbs. per square inch without any attention from the worker. Moreover, when the pressure to which the pump is set is reached the load is thrown off the motor, so that the apparatus is economical both as regards current used and wear and tear. The pump will provide the pressure for about half-a-dozen air brushes.

For those who have not electric connection the Aerograph Company's hot air compressor is a very neat arrangement, which requires only a Bunsen burner, or even a spirit lamp. It is sold at a cost of £10 10s., complete with reservoir, and provides the necessary pressure for one aerograph brush.

THE "UNIT" FOCAL-PLANE SHUTTER

(Made by the Thornton Pickard Manufacturing Company, Limited, Altrincham, Cheshire.)

The shutter of the self-capping quick-wind focal-plane type which we reviewed last year in reference to its fitting to the Thornton Pickard reflex, is now issued separately by the company in the three sizes of quarter, 5 × 4, and half-plate at £3 10s., £3 17s. 6d. and £4 4s. respectively. Although of such very rapid wind the makers have yet succeeded in reducing its thickness to



1¼ ins. — a degree of slimness to which the drawing does not do justice. The working parts of the shutter, apart from the blind are of metal and mounted on a single metal plate, the whole being simply mounted in the outer case of wood. Thus the removal of the side plate of brass allows of the entire shutter being taken out for examination. The very ready winding to any one of the series of blind-apertures, coupled with the speed with which time exposures may be given, will recommend the shutter to the practical worker. As now made separate it may be fitted to almost any camera of the stand or hand-stand type.

THE THORNTON PICKARD "VEST POCKET" CAMERA

(Made by the Thornton Pickard Manufacturing Company, Limited, Altrincham, Cheshire.)

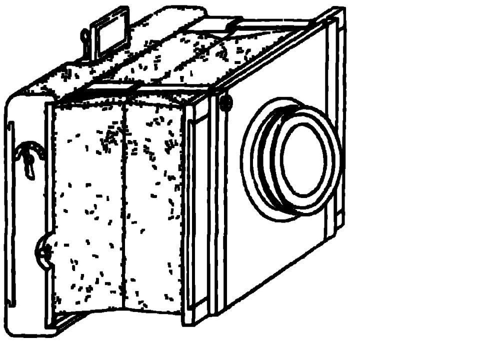
This new addition to the many varieties of Thornton-Pickard cameras is made to take the plate of 2 5/16 × 1¼ ins. and, though

of such dimensions that it may be carried in the waistcoat pocket, is nevertheless fitted with the "Unit focal plane shutter The camera front extends on four metal struts, and focussing is provided by the mount of the lens The camera is fitted with the convenient direct vision finder

THE "UNITA" FOLDING FOCAL PLANE CAMERA

(Made by the Thornton Pickard Manufacturing Company Limited, Altrincham Cheshire)

In this, the first, model of Thornton-Pickard folding focal-plane camera the shutter provided is the "Unit" to which reference has already been made This type of shutter no doubt is responsponsible for the small bulk to which the makers have reduced the apparatus whilst as regards weight also the "Unita" is one of the lightest focal plane cameras we have handled The shutter is pro



vided with pneumatic and trigger release, the latter being of the excellent form with which pressure is a direct thrust against the body of the worker, whilst the pneumatic release allows of the use of the T P time-valve, giving the series of exposures of one second and large fractions of a second Finished throughout in black leather and black ebonised wood the camera is of very handsome but unobtrusive appearance It may be fitted with the usual lenses in focussing mounts, rising front for which is provided The finder is of the direct-vision type fitted with magnifying lens, which can be used or turned out of the way at will

THORNTON-PICKARD REFLEX CAMERAS

(Made by the Thornton Pickard Manufacturing Company, Limited, Altrincham Cheshire)

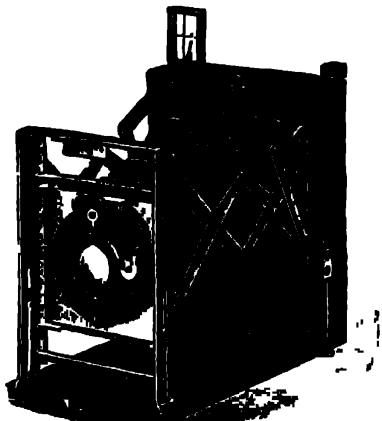
The "Unit" shutter used on both the "Royal Ruby" and "Ruby Nos 1 and 2" represents the chief direction in which these reflector cameras have been further improved The "Royal Ruby," it will be remembered, has the universal rising and swinging front of the

"Ruby" camera, and allows of very long extension and the widest range of lens movements In the case of the "Ruby's," these cameras are now built with a detachable lens box, provided with sky-shade, which is very nicely fitted so that it stops in any position The camera is fitted with reversing back in the case of "Ruby No 1," sold at £8 10s , whilst in the case of No 2 the double-extension instrument the back is made to rotate there is rack and pinion adjustment of the front, and the total extension of 12 ins is obtained with the single pinion head, which automatically takes up the supplementary rack

THE "STEREAX" AND "KIBITZ" FOLDING CAMERAS

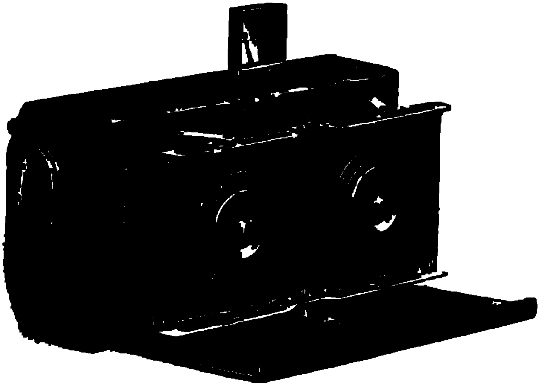
(Sold by A. L. Staley and Co , 19, Thavies Inn, Holborn Circus, London, E C)

In this very portable stereoscopic camera, the external dimensions of which are slightly less than 7 x 3¼ x 2¼ ins the method of focussing is that already described under the "Nettel" cameras, namely by means of a fine screw adjustment on the front The camera is fitted with self-capping focal-plane shutter with 2 degrees of spring tension and alteration of width of slit very conveniently



made by pressing down the pointer placed within the winding key Complete with six single metal slides, but without lenses, the price is £6 15s , whilst a fixed focus model, with all the other movements except that of focussing costs £6 The very rapid opening and closing of the camera is an excellent feature of the instrument, the lens front coming out and the finder erecting itself on the camera being opened

The stereo "Kibitz" is again similar in general design to the "Stereax," and forms an excellent pocket camera strongly made, and with the convenient lazy tongs extension and focussing. The

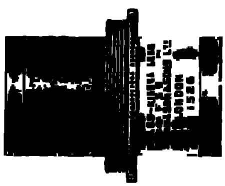


camera comes out automatically to any focus to which it is set. The price in 5½ x 2½ size, complete with six metal dark slides, but without lens or shutter, is £3 10s.

THE "HOLOS KINORA" LENS

(Made by W. Watson and Sons, Limited, 313, High Holborn, London, W.C.)

In this lens of 2⅞ in. focus the "Holostigmat" type of construction has been followed in order to obtain a lens of the large aperture of f/3.5 suitable for cinematograph taking cameras. The lens is

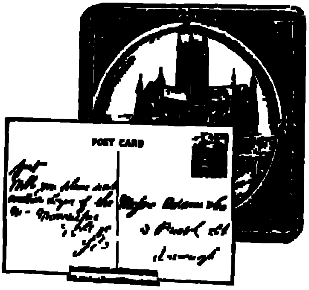


mounted in a rigid barrel projecting just over 1 in. behind the flange, and is fitted with iris diaphragms down to f/22. Even at the full aperture the instrument covers excellently the cinematograph standard size of picture, and should be a most serviceable lens for work of this kind, as also for making direct enlargements in the camera of quite small objects. The price is £5 5s.

THE "MONOSCOPE" VIEWING MIRROR

(Made by J Ashford, 179, Aston Road, Birmingham)

Under this name is supplied a circular concave mirror of 4½ ins diameter, mounted in a stout wood frame covered in leatherette It provides a convenient and realistic means of viewing postcards and other photographs or drawings of postcard size, the card being

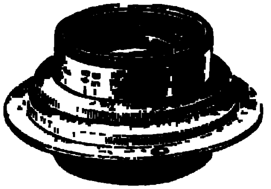


fixed in the clip of the metal strut attached to the mirror and the observer viewing the highly magnified reflection over the top of the card In viewing subjects placed the vertical way of the postcard the latter is inserted as before and the apparatus held sideways The apparatus fulfils its purpose excellently, and should be a very saleable article in conjunction with picture postcards The price of a single monoscope is 2s 9d

THE ROSS HOMOCENTRIC CINEMATOGRAPH LENS.

(Made by Ross, Limited, 3, North Side, Clapham Common, London, S W)

In this lens the makers supply a cinematograph lens of 3 in focal length, but of aperture $f/4\ 8$, and covering a circle of 4¼ ins This is a very highly corrected lens, of quality equal to the well known "Homocentrics" of other types, and it would obviously



be well adapted for use on a 3½ × 2½-in plate On such a plate it would include a moderately wide angle, and might be of exceptional value at times The small cinematograph picture is, of course, covered perfectly at full aperture, and for this kind of

work a better lens can hardly be wished for excepting when a larger aperture such as that of the Ross Zeiss "Tessar" is required The price of the f/4 8 'Homocentric" in rigid mount with iris diaphragm is £5

COOPER HEWITT MERCURY-VAPOUR LAMP FOR STUDIO AND PRINTING

(Sold by O Sichel and Co, 52, Bunhill Row, London, E C)

As sold by Messrs Sichel, the lamps are mounted on a frame, which is detachable from the arm of the supporting standard, and thus allows of the outfit being readily transportable in a cab, the lamps themselves inside under the photographer's care, and the standard outside This facility is doubly useful in the case of the mercury-vapour lamp, since the small amount of current required may be taken from an ordinary connection, even from the plug of an incandescent lamp, and therefore the light may readily be used in ballrooms, private houses, and other premises where the electric supply would not be sufficient t run an arc The importance of this fact to the professional photographer has been emphasised over and over again, but is appropriately repeated once again in connection with the present lamp, the cost of which (complete) is £20 19s to £22 18s (according to the voltage), from which sums Messrs Sichel offer professional photographers a substantial discount

The lamp is so fitted that it cannot be connected wrongly to the terminals It is made so that it can be conveniently employed for printing the frame of tubes can readily be adapted for enlarging purposes, no condenser being necessary It may be said, in conclusion, that the photographer, before complaining of the colour of the mercury light, should try the simple experiment of putting in two red incandescent lamps to supply the red rays which ... king in light He need not fear as did a recent naive correspondent, that these red rays will sh... the light

A STEREOSCOPIC PRINTING FRAME

(Made by W Watson and Sons, Limited, 313, High Holborn, London, W C.)

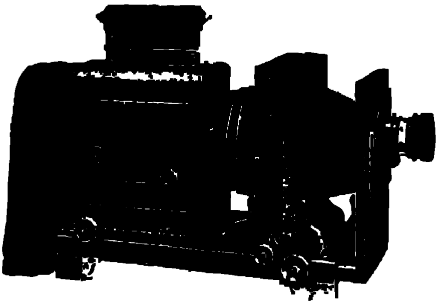
A printing frame serving for the making of full-size stereoscopic transparencies from the standard 3¼ × 6¾ in negative intact is made by Messrs. Watson at the price of 5s When making the first exposure the negative is pushed to one end of the frame and when making the second to the other the positive transparency plate in each instance being pushed to the opposite extremity of the frame The aperture through which exposure is made is conveniently provided with a shutter

THE "RECORD" ENLARGER

(Made by W Butcher and Sons, Limited, Camera House, Farringdon Avenue, London, E C)

In this new model of their enlargers Messrs Butcher have provided a universal stage for the negative giving rise, swing, and tilt by three independent rack and pinion adjustments The lantern

is also provided with rack and pinion, junction between negative stage and lantern being made by triple telescopic tube The body of the lantern is excellently provided as regards ventilation, but leakage of light is perfectly obviated by the light traps in the base



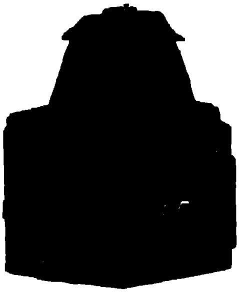
the [illegible] apsing [illegible] Rise and fall of the lens panel operated by rack and pinion [illegible] also fitted, whilst, of course, the ordinary extension of the front is by the same movement The price complete with condenser, but without projection lens, is £4 15s in quarter-plate size, £7 15s in half plate For the full range of movements provided these are extremely moderate prices, but Messrs Butcher supply an even lower priced enlarger, the "Abbeydale," sold at £3 5s in quarter plate and £5 15s in half plate This resembles the "Record" in general construction, has the rack and pinion tilt but is provided with negative carrier of a simpler pattern It is nevertheless an excellent enlarging lantern for the amateur worker

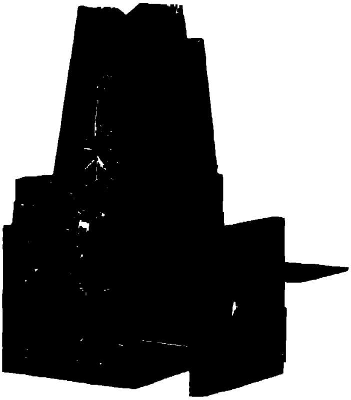
NEW MODELS OF REFLEX CAMERAS

(Sold by Ross, Limited 3, North Side, Clapham Common, London, S W)

In the reflex camera of the convenient $3\frac{1}{2} \times 2\frac{1}{2}$ in size which Messrs Ross supply the camera is made to take the picture the landscape way of the plate, and the focussing hood takes the ingenious form of a perfectly closed hood, provided with a single magnifying eye piece The hood is quickly collapsible, and, being attached to a separate frame, can be removed in an instant from the ground glass, which can thus be cleaned, and, further, gives access to the mirror The camera is provided with a very rigid extension, allowing of a total length between lens and plate of $7\frac{1}{2}$ ins, and it is fitted with a focal-plane shutter of adjustable slit aperture, giving a very wide range of exposures The size over all is 5 × 5 × 5 ins Fitted with three double slides and Ross f/6 3 5 in lens "Homocentric" the price is £14, or with f/5 6 "Homocentric," £15 With $4\frac{1}{2}$ in Ross Zeiss "Tessar" f/4 5 the price is £15

In the larger sizes of this reflex, quarter to half plate, a tropical model is made, being built of teak, with extra brass binding and lacquered brass fittings. The bellows and hood are of Russia leather, and the lens is provided with extra large shade, also covered with Russia leather. The reflex is now fitted with wheel





and pinion adjustment turning back without projection, a convenience which is available in the ordinary as well as in the tropical model. The price of the latter in quarter-plate size, with three double dark slides and 5, in Homocentric $f/6.3$, is £22 2s.

NEW MODEL "COOKE" LENSES

(Made by Taylor, Taylor, and Hobson, Limited, Stoughton Street, Leicester.)

A further convenience in use of the extension lenses for the "Cooke" anastigmats which Messrs. Taylor, Taylor, and Hobson have made for some years past is provided by a new pattern of the extension lens for the Series II $f/4.5$ "Cooke." These are made to replace the front glass of the lens instead of the back, as in the other series. They are sent out mounted in brass cells with the convenient standard thread, and hood for the lens cap.

The "Cooke" lenses are now also made in sunk mounts of the form specially useful in reflex and other hand cameras. The focal lengths listed in this form are 5, 5½, 6, 8, and 10½ ins., whilst the series of lenses in which these are obtainable are the $f/4.5$ Series II, $f/6.5$ Series III, $f/5.6$ Series IV, and $f/8$ Series V. We have had an opportunity of examining a lens of the Series IV, of 6.2 ins. focal length, intended for a 5 × 4 camera, and are bound to express our admiration of the beauty of the mechanical work—there is no need to repeat encomiums of the optical quality of the "Cooke" lenses. The lens in question projects into the camera

about 1¼ in from the back of the flange, the front and rear combinations being very quickly detached and refitted owing to the special form of thread adopted by Messrs Taylor, Taylor, and Hobson

THE TINY TELLA REFLEX

(Made by the Tella Camera Company, 68, High Holborn, London, W C)

In this reflex camera of 3½ × 2¼ size the makers by a quite distinct design, have produced a body of dimensions slightly under 4½ × 5¾ × 5 ins This portability is secured apparently by making the focal-plane shutter pass towards the front and lower part of the camera when being wound, the winding key is placed near the front of the instrument The shutter is adjusted for speeds

from 1 1,000th to 1 5th of a sec which are obtained by turning the key until the actual speed num appears in the small window on the left of the camera W'en exposing by time, the shutter is wound to the full extent pr on the release then uncovers the plate and a second pressure covers it Like the other Tella reflexes made at the firm's London works the camera is fitted with rack-and-pinion rise of front, reversing back, self-erecting hood, which is immediately detachable, and a long extension—in the 3½ × 2½ size, of 8½ ins The price, complete with Ross "Homocentric" $f/6.3$ and six single metal slides is £14, whilst a special tropical model is made at th price of £14 14s for camera and six slides only

THE 3½ × 2½ "ARGUS" REFLEX

(Made by W Watson and Sons, Limited, 313, High Holborn, London, W C.)

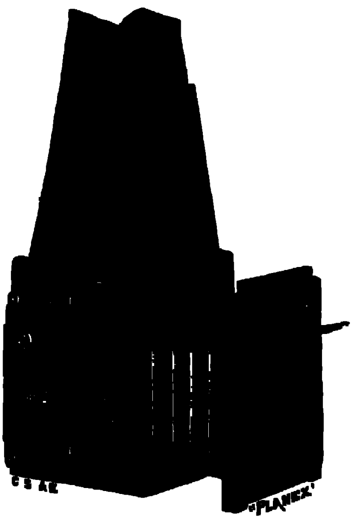
Messrs Watson have now pl ed on the market a 3½ × 2½ size of their well-known and excellent "Argus" reflector camera The camera is of the same substantial construction as the larger sizes, and measures over all about 5 × 5½ × 6½ ins The total extension is

close on 8 ins., the front being very rigidly supported on a pair of metal runners. There is a rise of front of $\frac{5}{8}$ of an inch, as well as a fall of nearly half an inch, both movements being actuated by a rack and pinion. The hood is self-erecting, and folds back on its hinges, giving instant and complete access to the focussing screen. In the important matters of the shutter and mirror the makers adhere to the movements found successful and reliable in the larger patterns of "Argus," that is to say, a mirror which falls again after exposure, and a shutter which is adjustable both by alteration of slit and tension, the latter while the shutter is set. Complete with rotating back and three solid double slides, the price of the $5\frac{1}{2} \times 2\frac{1}{2}$ "Argus" is £11 7s., with three book form slides the price is £12 10s., or for the same price the camera may be obtained with a changing-box for twelve plates.

NEW MODEL "PLANEX" CAMERAS

(Sold by the City Sale and Exchange, 93 and 94, Fleet Street, London, E.C.)

In the two models of reflex camera, the "All British" and the "No. 2," Planex, supplied by this firm a number of minor improvements have been made in the 1910 instruments whilst pre-



serving the general design. In the "All British" (illustrated) a very large lens shade is provided, whilst the focussing hood has a depth of 9 ins. The total extension obtained by aid of the reversing lens mount is 11 ins. in the quarter-plate size, whilst both in this camera and the "No. 2" an improved type of quick wind and

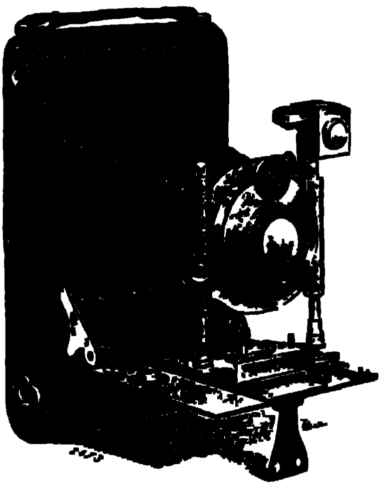
adjustable focal plane shutter is provided Both cameras have the full range of movements of the previous model, whilst a new feature of the "No 2" is a rotating instead of a separate reversing back The prices of the "All British" range from £9 10s, those of the "No 2" from £7 7s, in each case with three double dark-slides

The City Sale, it may be added, now supply their 'Blitz' double anastigmat in a new series of f, 4 8 aperture, these lenses being especially suitable for the reflex camera, since at the full aperture they cover the plate for which they are listed, whilst the separate components can be used as long-focus lenses In addition to this, at a medium stop the complete lens may be used as a wide-angle on a larger plate The prices range from £4 4s for the 5 in focus to £19 10s for the 15 in

"ENSIGN" FOLDING POCKET CAMERAS

(Made by Houghtons, Limited, 88 and 89, High Holborn London, W C)

The well known firm of High Holborn has this year, among a large series of new designs in cameras, introduced two models of the all popular folding film camera, one, the 000, being fitted with "Ensign" Simplex Auto shutter, whilst the 00 has the Bausch



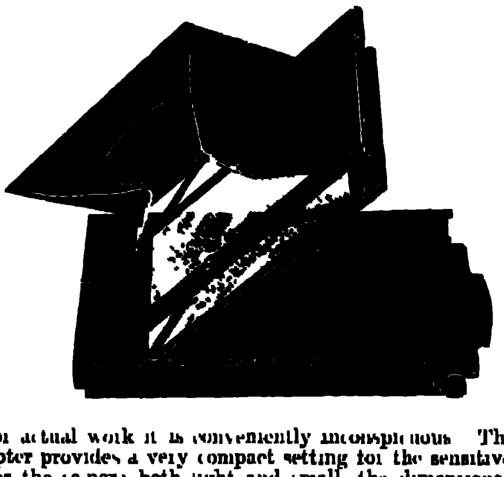
and Lomb "Automat" The 000 is a somewhat cheaper line of instrument, but has all the movements which are called for in cameras of this description—namely, rise and cross front movements, reversible finder and level, infinity catch and diaphragm scale It is made in the quarter-plate and postcard sizes, at prices from 45s

in the former, which includes an R R lens working at $f/8$, to 70s in the latter, complete with Beck $f/8$ R R The roll-holder portions of the cameras, like the other parts, are very well and substantially made, and the instruments in practical usefulness, solidity, and appearance can take their place with any cameras of the kind The 00 series, shown in the drawing, are priced at from 63s in the quarter plate to 127s 6d in the postcard size, this latter having $f/5.8$ anastigmat and, as already stated the B and L shutter giving exposures from 1 100th to 1 sec, in addition to time and bulb

THE "HOUGHTON" ENVELOPE CAMERA

(Made by Houghtons, Limited 88 and 89, High Holborn, London, W C)

Specially built to take the envelope adapter introduced by Messrs Houghtons about two years ago, this camera is of the box form shown in the drawing, and provided with movements in the way of focussing, finders, etc, which are familiar to users of "Holborn" box instruments Among these we may mention the convenient adjustment whereby, when the lens is capped, the finders are darkened The camera is finished in polished mahogany and brass, and presents a handsome appearance when opened although when



closed for actual work it is conveniently inconspicuous The envelope adapter provides a very compact setting for the sensitive plate, and keeps the camera both light and small, the dimensions of the quarter-plate being under $7\frac{1}{4} \times 6 \times 4\frac{1}{2}$ ins The price, complete with focussing screen and hood, R R lens, and "Simplex Auto" shutter, is £2 10s, whilst Nos 2, 3, and 4 of the series, with other shutters and lenses are marketed at 63s, 70s, and 90s

The above system of carrying plates or films to any convenient number ready for exposure in a simple apparatus no bigger than an

ordinary dark-slide has been very conveniently embodied in the "Houghton" envelope and adapter, described in the "Almanac" at the time of its introduction, but we should record the improvement in the form of envelope by which the plate or film is more expeditiously inserted. In the present form of the adapter the ground glass focussing screen is safely carried between the wooden back forming the focussing hood and the shutter of the adapter. The spring catch is so designed that the adapter is instantly opened to receive the envelope and as instantly closed. The system is applied by Messrs. Houghtons to a variety of sizes of cameras up to half-plate, the price of a quarter-plate adapter varying from 10s. 6d. to 17s. 6d., whilst the envelopes cost 2s. per dozen, unloaded, or 3s. per packet of ten charged with "Ensign" flat films.

THE "ENSIGN" DEVELOPMENT TANK

(Made by Houghtons, Limited, 88 and 89, High Holborn, London, W.C.)

In this tank the plates (in the rack) are put in at one end of the tank, whilst the developer is inserted at the other through an aperture one inch in diameter, which is closed by a screw stopper. The other end of the tank is likewise closed by a full size lid provided with a rubber washer, the lid being fixed, forming a water-tight joint with the top of the tank by means of the strong wire springs. One advantage of this latter mode of securing the lid is that if the spring should chance to become slightly weaker with use, it is only necessary to bend one of the pieces somewhat in order to secure the firm adhesion of the lid. It will thus be seen that, if desired, the rack and tank can be placed in a changing bag with the exposed plates, the latter placed in the rack, and the whole removed with the plates perfectly protected from light into the daylight. The developer is then applied through the circular aperture, the cap screwed on, and development allowed to proceed.

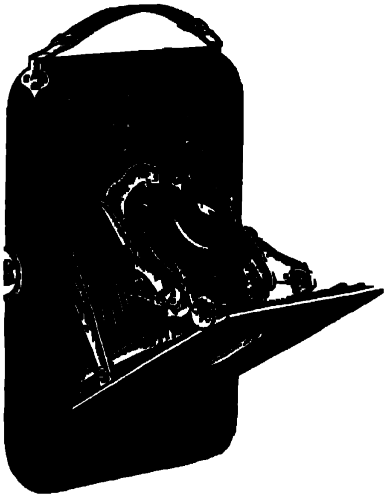
The tank can be used in either position, with the result that markings which occasionally result from allowing the plates to remain in one position throughout the whole time of development are avoided, all that is necessary being to quietly reverse the position of the tank, allowing it to stand upon the lid for part of the time, and for another period on the screw cap. The apparatus is very strongly made in nickelled brass, and may be used for both developing and fixing. The price of the tank in quarter-plate size is 7s. 6d., in 5 × 4 or postcard (5½ × 3½) 10s. 6d., and in half-plate, 12s. 6d. The brass racks are supplied in these four sizes at 2s., 2s. 6d. and 3s. 6d., whilst brass tanks, complete with racks but without the other fitments, are sold at 1s. [illegible], and 7[illegible] respectively.

THE "AUTOLOX" ROLL FILM CAMERA

(Sold by the City Sale and Exchange, 93 and 94, Fleet Street, London, E.C.)

This folding pocket camera is of the self-erecting type, the act of drawing down the baseboard bringing the lens front forward and locking it in focus on distant objects. This is done without a[illegible]

undue complication of mechanism, and similarly when the camera is to be closed the only movement is to press down the supporting struts and push in the baseboard The camera, which is excellently



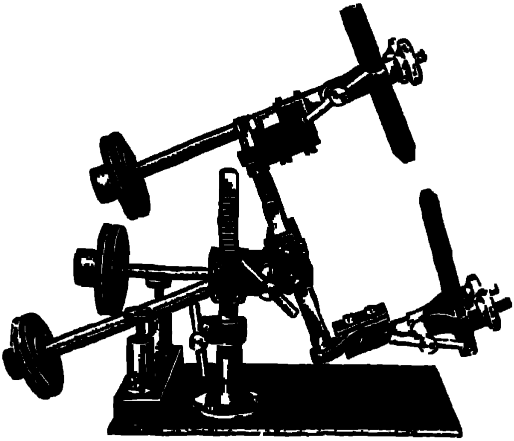
made, is of the double extension type, a very steady rack and pinion bringing it out for use with half of the double lens whilst the front is locked by pressing in the focussing head Another ingenious fitment is the provision of a separate focussing pointer when using the half lens The pointer is brought automatically into action on racking out the camera, and is carried back again out of the way when reverting to the normal extension With rise of front, "Compound" shutter, extra rapid "Aplanat" lens, direct vision finder, three single metal slides in wallet with adapter and hooded focussing screen when using plates, the price of the "Autolux" is £4 15s

AN AUTOCHROME PROJECTION LANTERN

(Made by W C Hughes, 82, Mortimer Road, Kingsland, London, N)

In this lantern, which is a modification of the excellent apparatus made by this old established firm for enlarging and projection, advantage is taken of the rectangular form of condensers to use a pair of unusually long focus, so that the light is a good distance—12 ins and more—behind the condenser As a further protection against the heating of the slide, a water tank is placed immediately in front of the condenser the slide being held in the usual carrier

in front of this, so that the worker may exhibit his Autochrome results without fear of injury in the lantern In quarter plate size the price, without lens, is £6 17s 6d complete with water tank



Messrs Hughes supply a small arc specially made for this lantern at the low price of £3 It is provided with all the necessary movements and like the lantern, is of excellent workmanship

THE PROJECTOR ARC LAMP

(Made by the Electrical Company, Limited, 121 and 125, Charing Cross Road, London, W C)

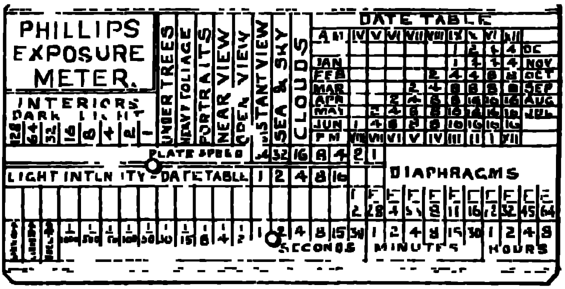
In the latest pattern of this leading company's arc lamp a right-angled pattern of the two carbons is adopted, and the lamp is provided with the necessary adjustments for separation and inclination of the carbons, raising the light and giving it sideway movement, etc Made for 50 amperes, the lamp may be used, if necessary, up to an amperage of 80 The price is £5 15s

THE PHILLIPS EXPOSURE METER

(Made by W H Phillips and Son, 98, Truro Road, Wood Green, London, N)

A most convenient form of exposure calculator is made under this name It provides the means of ascertaining the exposure for the widest range of subjects, from cloud and sky to dark interiors, in all cases without any kind of mental calculation, and at the same time taking account of all the necessary factors, such as light-intensity, plate-speed, and lens-aperture Not only this the calculator is so arranged that the most variable element in the case, the condition of the sky, whether "sun" or "cloud," is adjusted last, so that the worker can keep his meter set to a given subject and plate,

and make the final adjustment in an instant, according to the time of day and state of the light. This shows him the exposure for each of the series of eleven diaphragms from $f/2$ to $f/64$. We think the designers of the meter have taken a very sensible course in dividing plates, as regards speed, into seven classes, denoting the most rapid by 64, and taking the numbers 32, 16, 8, 4, 2, and 1 as the denominators of slower plates. In the instructions it is stated that these Phillips numbers are about 1-10 of the H. and D. number, but it is probable that every worker would fix on the Phillips number which he finds most advisable by one or two preliminary exposures.



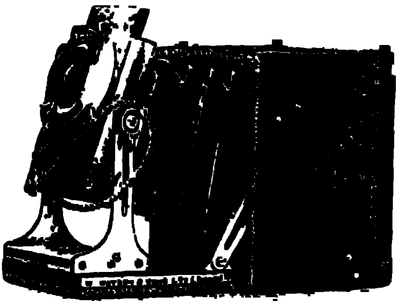
The meter is made in polished boxwood, contained in a cardboard case, at the price of 5s. 3d., post free; a No. 2 pattern, in boxwood, stained black, with white lettering and white ivorine sliding scales, price 10s. 3d.; a No. 3, in white ivorine with black lettering, in wooden case, price 15s. 3d.; whilst an "edition de luxe," made in aluminium, is also supplied, price 20s. 6d. The instructions for use with the meter give a good deal of useful information, including the means of using the meter in conjunction with the Steadman "Solio" method of actually measuring the value of the light.

THE "ALPHA" CAMERA, NEW MODEL.

(Made by W. Watson and Sons, Limited, 313, High Holborn, London, W.C.)

In this new model of their well-known hand-stand camera, Messrs. Watson have provided most completely for the requirements of those using a camera both in the hand and on a stand. The baseboard drops and the camera can then be actuated by an auxiliary rack and pinion placed at the back near to the plate, a very convenient movement when using a wide-angle lens. At the normal and full extension focussing is done with the front pinion which provides for a total distance from lens to plate of 12 ins. in the quarter-plate size. The front rises in its struts, and has a further rise of nearly an inch by means of the lens panel, and is also given a swing movement, the total range being ample for all descriptions of work. There is also a swing-back of ample movement, and,

of course, the usual reversing back The camera is, in fact, most conveniently fitted for the most varied photographic purposes, but measures, when closed, under $5\frac{1}{4} \times 6 \times 4$ ins It is substantially, though not heavily, built and costs, in quarter-plate size, complete with three double slides and finder, £8 8s, an extra charge of 15s being made for the rack and pinion focussing when using the



wide angle movement Messrs Watson fit with the usual lenses and shutters including their own "Holostigmat," the series Ix of which has the great advantage of providing an f/4 5 lens, the separate components of which may be used as excellent f/9 single lenses Thus the No 5 "Holostigmat" of $5\frac{3}{8}$ in focus gives single lenses of $8\frac{1}{2}$ and 10 ins focal length

THE "FRECKLETON" PORTABLE SHADING SCREEN

(Made by Marion and Co, Limited, 22 and 23, Soho Square, London, W)

This new and portable accessory for the portrait photographer is equally serviceable in the studio or on the many occasions when a portrait is made at a sitter's home It consists of a shallow box containing two screens, one of semi-transparent engineer's tracing cloth and the other of an opaque green cloth Each of these is about 3 ft. 6 in in width and is mounted on a spring roller The box is fitted with a triple-extension metal rod, giving a total height, when extended and fixed, of 8 ft It is erected in the space of a few seconds, and either of the screens is supported on it to this full height in the same time, or both may be used together, the opaque screen usually partly extended where it is necessary to cut off light on the lower part of the sitter The containing box thus forms a solid base or support for the screens, which latter, of course, may be replaced by the ordinary background material, when the screen becomes a very useful accessory to the amateur portraitist of head and shoulders or three-quarter-length figures The price of the apparatus complete, with two screens as above described, is £1 15s

THE "ORIEL" LANTERN-SLIDE CLEANING FRAME

(Made by the Camera Construction Company, Eagle Works, Durham Grove, Hackney, London, N E)

One of the simple, but useful, accessories for lantern-slide work is a holder for cleaning and polishing cover glasses which, in the "Oriel" pattern, is very substantially made in polished hard wood

and provided with thumb holes, as shown in the drawing, so that the cover-glass can be instantly removed The price of the cleaning frame is 1s

THE "DE BECHI" SUPPLEMENTARY LENS

(Sold by Alfred B Allen, 20, Endell Street, London, W C)

In this attachment, the supplementary lens is placed behind the back combination of an ordinary rectilinear of say f/8 aperture, which latter, according to the power of the supplementary lens selected, is increased to f/6, f/5 or f/4 with a corresponding reduction in the focal length Possessors of a half plate camera and lens who may thus wish to make exposures on a smaller scale but at the full aperture of, say, a portrait or anastigmat lens will find this attachment of frequent service The supplementary lenses, as we would expect of one having the long experience of Mr Allen in photographic apparatus and its repair, are very neatly mounted for attachment to the back of the R R or for insertion in the aperture of a roller-blind shutter The set of three suitable for giving the apertures above mentioned is sold at 7s 6d

NEW MODEL OF THE "ADON" LENS

(Made by J H Dallmeyer, Limited, 25, Newman Street, Oxford Street, London, W)

A new form of mounting of the "Adon" lens has been introduced The loose black lengthening tube behind the front lens has been dispensed with, and a sliding tube substituted This makes the lens more portable, and in other ways more convenient in working The power of the negative lens has been slightly increased, and the definition at full aperture has been improved This new "Adon" will not be on sale until the New Year

Messrs Dallmeyer also supply the "Adon" with a hood of about 1½ ins depth, the use of which is of very great advantage in securing bright telephoto pictures The hood may be obtained either as a fixture on the lens mount—sliding on the latter so that

it does not add to the bulk of the lens and allowing at the same time of an orthochromatic filter being screwed into the barrel of the lens Or, if the filter is not required, the hood itself may be made to screw into the internal diameter of the lens mount

THE "MERITO" PLATE DEVELOPING TANK

(Made by W L Parkinson, Limited, 5, Commutation Row, Liverpool)

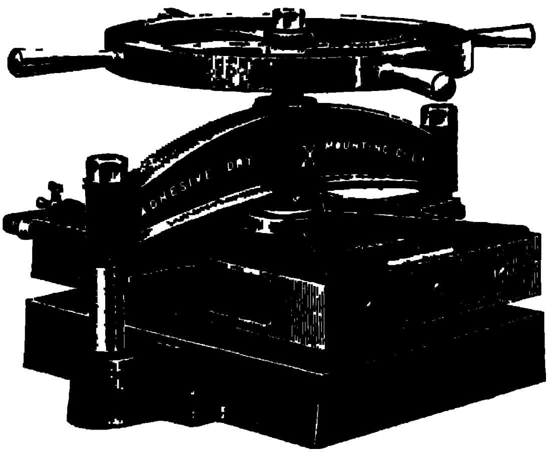
This piece of apparatus for the development, fixing, and washing of plates is very solidly made in brass, and is provided with light-trapped inlet and outlet, so that in addition to allowing of all the operations being performed in daylight, once the tank has been charged with plates in the dark, it can be used in daylight not only for development, but for the fixing and washing of the plates It is provided with a strongly made rack holding six plates in three grooves back to back, and the lid is held firmly by a clamp which instantly makes a water tight joint, so that the tank in use can be turned in any position, and movement of the developer—which is very necessary in order to avoid markings in tank development—may thus be given The price of the tank in quarter-plate size is 6s 6d, 5 × 4 postcard 8s 6d and half plates 10s 6d

THE STUDIO "A" DRY-MOUNTING PRESS

(Sold by the Adhesive Dry Mounting Company, Limited, 27, Fetter Lane, London, E C)

In this new type of dry mounting machine, a print as large as 15×12 can be taken and attached at one pressure to mounts up to

$17\frac{1}{4} \times 24\frac{1}{4}$ ins These dimensions thus fit the press for the purposes of the professional photographer, whilst the price, £5 5s, should be

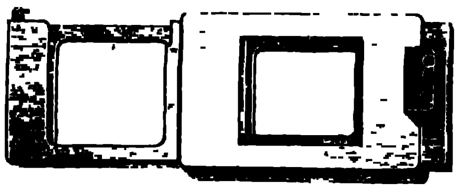


within the means of even a small studio The press may be used with either gas or spirit, a special heater for the latter being sold at a cost of £2 10s

THE BEARD "BOTH-WAY" CARRIER

(Made by R R Beard, 10, Trafalgar Road, Old Kent Road, London, S E)

This lantern carrier is of to-and-fro type, but is made so that it may be used in any open lantern stage either sideways or up and down The slide is firmly retained in place until required



on the screen whilst the carrier is very accurately made in metal chiefly aluminium with brass for the working surfaces, and is fitted with a finger knob of red fibre, the non conducting properties of which will allow of its being readily handled, however warm the lantern may become The price of the carrier is £1 1s

THE HUME ENLARGER—RACKING MODEL

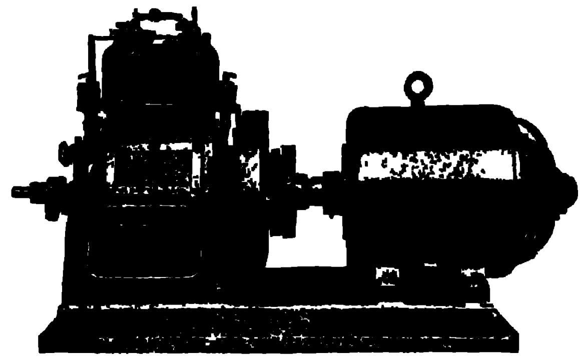
(Made by William Hume, 14, Lothian Street, Edinburgh)

Mr Hume, whose many models of cantilever and other enlargers have stood the test of many years before the photographic public, has now brought out a pattern of instrument in which provision is made for tilt of the negative for the correction of distortion, whilst the range of the instrument is further enlarged by making the connection between negative stage and lantern by means of a bellows in order to provide for lenses of different focal length In other respects, as regards excellence of workmanship and solidity of construction, the model follows the precedent of the other Hume enlargers, and perhaps no more eloquent praise than this could be accorded In the quarter-plate size, complete with condenser and projection lens the price of the new racking model (No 5) is £4, in postcard £5 10s and in half plate £7 2s 6d

THE BEARD COMBINED MOTOR AND DYNAMO

(Made by R R Beard, 10, Trafalgar Road, Old Kent Road, London, S E

For the purposes of lantern and cinematograph work in places where an ordinary electric current is not obtainable this self-contained equipment of engine and dynamo will prove of service particularly to cinematograph exhibitors among our Colonial readers The engine is made in three patterns of one, two, and three

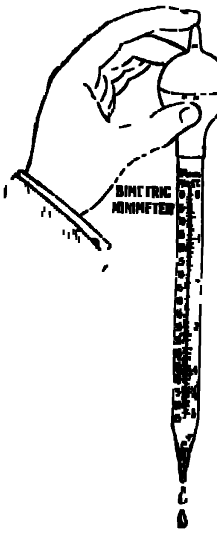


cylinders respectively, sufficient to generate from 660 to 6,000 watts Though intended primarily for generation of current the engine may be used as a motive power for driving other machinery As supplied, it is mounted on a cast-iron stand, includes 6- to 8 gallon tank, accumulator, induction coil, and cooling tank, but not the switch-board and other accessories which may be necessary The prices of the outfit range from £45 to £150

THE "DEGA" MINIMETER

(Sold by Chas. Zimmermann and Co., Limited, 9 and 10, St. Mary-at-Hill, London, E.C.)

This is a most handy instrument for the rapid and accurate measurement of small quantities of liquids, such as rodinal, or other single solution developer, only a little of which is used at a time when developing an odd plate or two. The graduated measure, when used for quantities from 5 minims to, say, 1 drachm, can easily give rise to considerable errors arising from the angle at which the level of liquid is viewed, the quantity of liquid left in the measure, etc., and it is not practicable to measure off small quantities quickly. In both these respects the "Minimeter"—which is an improved chemical pipette—has claims to recommend it. It consists of a glass tube 7 ins. in length, graduated to deliver up to 80 minims, or 5 ccs. The minim scale is graduated into 5-minim divisions, the metric scale to ½ ccs. To use the meter, all that is necessary is to drop it into the stock bottle of solution, squeeze the bulb strongly, and release it gently, removing the tube when the liquid has risen to the 0 0 mark. Any desired quantity can now be delivered most accurately into a measure or other receptacle by gently deflating a projection on the top of the bulb. By so doing, air is admitted to the top of the tube, the liquid escapes, and on releasing the projection the level of the slowly falling liquid is arrested at any point. For working in the dark-room the meter saves altogether the trouble of drip from bottle necks, economises developer, and increases the exactness of measurements, which, as we have said, may often be out to an unrealised extent. The "Minimeter" is sold at 1s. 6d.

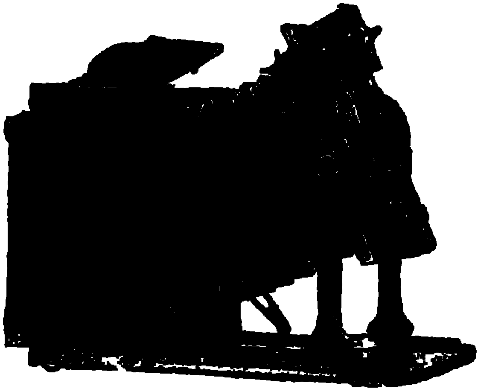


THE ADAMS "VAIDO" UNIVERSAL CAMERA

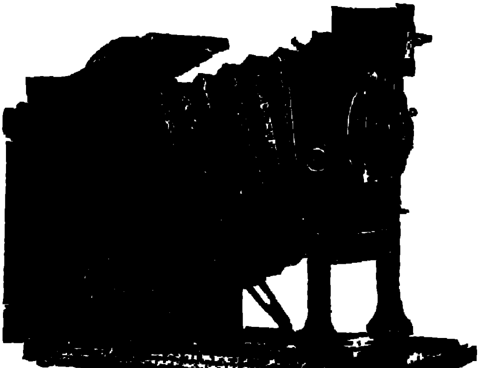
(Made by Adams and Co., 26, Charing Cross Road, London.)

The illustrations, which are direct photographs of this camera, show very clearly the range of movements which the makers have provided in this instrument of the self-contained hand-stand type. They show the result obtainable, but unfortunately they do not and cannot show the many nice devices and ingeniously contrived pieces of mechanism which permit of convenient and rapid manipulation. Remove the occasion of fumbling with a screw or a catch, and you

provide a camera capable of better work. This is a sound principle, and one which makers who know not only cameras but the users of them will confirm. And that principle is evidently one which the makers of the Adams cameras keep prominently before them. It is

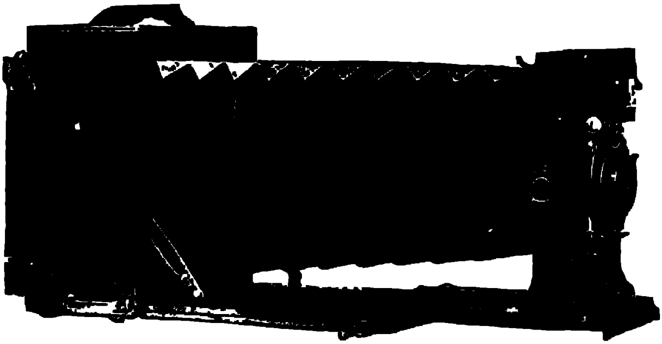


in this respect that the new "Vaido" has points of superiority which the discriminating worker will appreciate. Take, for example, the rise of front. Mr. Adams provides, as do many makers, the most convenient rack and pinion adjustment of it. But



he goes further, and gives the head of the pinion the star form seen most plainly in the second photograph, so that when the front is close in at the wide-angle position, the worker can use one finger only and do easily with a poking movement what he could not readily do

in the case of screw-head requiring two fingers to move it A refinement perhaps, but nevertheless one which the worker will be grateful for The same purpose, to provide fittings which make for smoothness of manipulation, might be instanced in other items—but why should we demonstrate to all the world how the photo-



grapher is so pampered by makers like Messrs Adams that he has but to pull out a lever somewhere and allow the rest to happen? At any rate, he is relieved of the need of thinking much as to the adjustment of his instrument

As the drawings show, the "Vaido" is fitted for use in the hand

by aid of its focussing scale and the most valuable "Idento" finder, which indicates the change in the picture when the front is raised The "Vaido" has a large rise, and useful as that movement is in hand-camera work its value is practically negatived unless the finder shows what is happening

Specially valuable, too, is the rotating back, which dispenses with the loose reversing frame, and permits the change from upright to landscape with the plate all ready for exposure The central-swing movement of the lens panel is still another feature that earns our commendations, not only for its simple method of being put in and out of action, but for the fact that though the whole camera is highly compact, the lens panel accommodates the large $f/4.5$ anastigmats of suitable focus

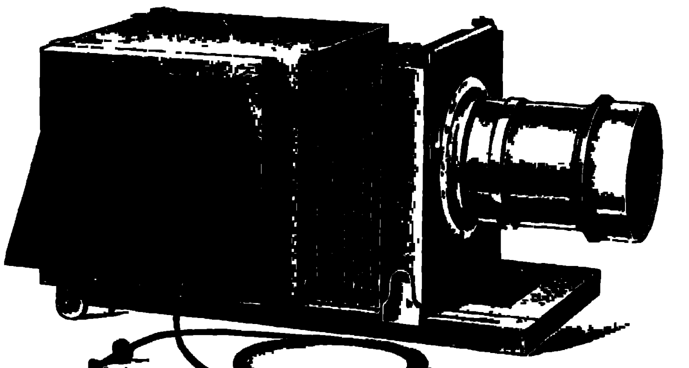
The camera provides a full long extension and is fitted with a second scale for the half-lens or a second lens of long focus, while, of course, the hooded focussing screen allows of actual focussing being done in the many circumstances when such course is necessary

We have left to the last the new focal-plane shutter, the "Minex," fitted to the camera This we describe in the notice on another page of the "Minex" reflex The shutter is that fitted to the "Vaido" We have said enough to show that in the "Vaido" the makers have provided an instrument without a single loose part, is light, compact and simple, yet capable of responding to the most extreme claims of the photographer

THE "SICHEL" STUDIO REFLEX CAMERA

(Sold by O Sichel and Co, 52, Bunhill Row, London E C)

The advantages of a camera of the reflex type for studio portraiture, particularly of children, being very considerable, there is good reason to call attention to a model of camera built solely for



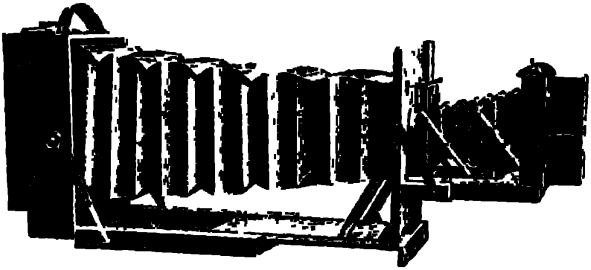
studio work The exposure is given by means of the mirror, which is actuated by a spring and released with the "Antinous" attachment This allows of short exposures of the duration given with "cap off and on" The focussing screen is placed at the side of the camera, and is thus conveniently viewed when the camera is used at the usual

height, but the instrument can be turned over on its side, this position allowing of a very low point of view being taken Focussing is done by rack and pinion from the rear, whilst the total extension of 24 inches is obtained by pulling out the front The minimum extension is 12 inches The instrument is solidly made, and complete with three double slides but without lens, costs £10 in the half-plate size

"N AND G" ENLARGER FOR "SIBYL" NEGATIVES

(Made by Newman and Guardia, 17 18 Rathbone Place, London, W)

A folding enlarger of very convenient pattern has been introduced y Messrs Newman and Guardia purely for use with their "Sibyl" ameras The illustration shows the manner of using the apparatus,



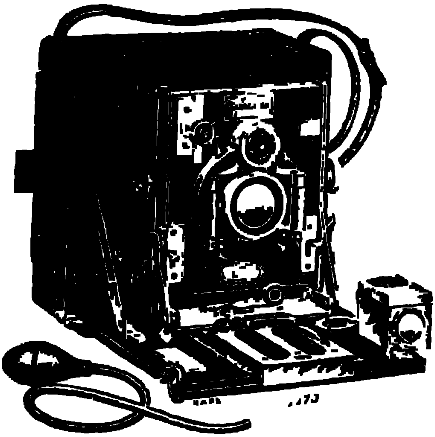
the "Sibyl" being simply placed on the outside board of the enlarger and a light-tight joint made by the special mounting provided by the latter The enlarger is made for both the $3\frac{1}{4} \times 2\frac{1}{4}$ and quarter-plate "Sibyls" to give a print of half-plate or whole-plate

in each case The prices are from £3 5s to £4 5s, and the apparatus, which is instantly folded after use, allows of large photographs being very quickly and easily made from the negatives of the "Sibyl"

THE "SANDERSON" HAND AND STAND CAMERA, 1909 MODEL

(Made by Houghtons, Limited, 88 and 89, High Holborn, London, W C)

In the latest model a rack and pinion adjustment is provided for the camera when used in the wide-angle position—that is to say, on that portion of the runner board which forms part of the back body of the camera In place of the hand adjustment, which formerly had to be made the camera, when being thus used for wide-angle work, is conveniently racked by a small screw projecting slightly from the back body Also the rising front in the "Regular" and "Tropical" models is now brought more into line with the



de luxe pattern by having a rack and pinion adjustment And, further, the reversing back is now released from the body by pressure upon a single stud, which actuates the two spring catches which secure the back, a movement which is certainly a convenience, as frequently when the camera is being held in the hand it is something of an inconvenience to raise both springs at the same moment The prices of the "Sanderson" with these additions and its already well-known features remain the same, and are described in the special booklet which Messrs Houghtons issue

"The separate items in the foregoing "Novelties in Apparatus" section are Indexed in the General Index to the Text portion of the Almanac," placed at the end of the volume

FORMULÆ FOR THE PRINCIPAL PHOTOGRAPHIC PROCESSES.

ORTHOCHROMATIC PROCESSES.

(Most of the formulæ in this section are those used in the three-colour and process department of the L.C.C. School of Photo-Engraving, Bolt Court, London, E.C., to the Principal of which Mr. A. J. Newton, we are indebted for assistance in arranging them in the present form.—Ed. B.J.A.)

Sensitisers for Gelatine Plates.

1.—*For blue-green and green.*

To sensitise up to wave-lengths 5,500 A.U., the best dye is *acridin orange*, N.O. of the Leonhardt Farbwerke, Mulheim, Germany. It is used as directed below for green and yellow sensitising except that ammonia must not be used.

2.—*For green and yellow, but not red.*

To sensitise up to 5,900 A.U., *erythrosine* is still the best dye, though it leaves the plates somewhat insensitive to bluish green. The most suitable dye is that of Dr. Schuchardt, Goerlitz, or of Meister Lucius and Bruning, Hoechst, a/M.

One part of dye is dissolved in 1000 parts of alcohol, and a bathing solution made as follows:—

Stock solution 1 : 1000	100 parts
Water	400 parts
Ammonia (0.880)	5 parts

This is a 1 : 5000 solution.

N.B.—Ammonia must not be used with acridin orange.

3.—*Green, yellow and red.*

To sensitise for all rays up to 6200 to 6400 A.U. the following are used:—

Orthochrome T, Pinaverdol, Pinachrome, or *Homocol,*

their order as red sensitisers being as above.

A stock solution is made containing 1 part of the dye in 1000 parts alcohol The bathing solution contains —

Stock solution	2 parts
Water	100 parts

This is a 1 50,000 solution

The stock solution will keep, but the weaker bath will not A red light is used, until it is seen that the solution has covered the plates, after which the operation must be continued in total darkness

4 —*Extreme visible red*

To sensitise for the extreme visible red, *pinacyanol* should be used The operations can be done in a weak green light, passing the part of the spectrum between 5,000 and 5,300 The dye solutions are prepared exactly as those of Orthochrome T, etc See above

5 - *Panchromatic Plates*

Use a 1-50,000 solution of a mixture of pinachrome and pinacyanol, viz, 3 parts pinachrome stock solution, 2 parts pinacyanol stock solution water 250 parts

6. -*Infra red*

The best sensitiser for the infra red is *dicyanine*, which is prepared and used exactly as pinacyanol, except that the stock solution must not be added to the water until the very last moment, when everything is quite ready, and the plate can be immediately flowed with the solution, as the weak solution loses its sensitising power very quickly

If ammonia is used with the cyanine sensitisers given in 3, 4, and 5, it must be quite pure, or fog will be produced It is best to dispense with it, but if used the proportion is about 1 part per 100 of sensitising bath

PRACTICAL NOTES ON BATHING

The dye solution is prepared in a measure, the plates are dusted and laid in a flat porcelain dish, which is large enough to hold nearly twice the number of plates it is desired to sensitise at one time These are put at one end of the dish, the dish is then tilted, and the dye solution poured into the other (empty) end, then the dish is tilted back, so that the dye solution sweeps over the plates in one even flow free from air bells The dish is now gently rocked for three minutes, then the plates are removed and washed in a good stream of running water for at least another three minutes Their sensitiveness will

probably be somewhat greater if they are washed for ten minutes They will remain good for months, kept under proper conditions, after three minutes' thorough washing, if bathed according to the formulæ given above

The water tap should be fitted with one of the small anti splash filters, the fine wire gauze in which retains any solid particles that may be in the water

After washing, the plate should be well swabbed with a wad of cotton wool, and then placed in a drying cupboard The quicker drying takes place the better, so that if a current of warmed, filtered air, free from fumes, can be sent through the cupboard it is an advantage, though the absence of this convenience need not deter anyone from sensitising plates Drying can be hastened by placing a dish of dry calcium chloride or quicklime at the top of the cupboard

Sensitisers for Collodion Emulsion.

FOR GREEN AND GREENISH YELLOW (Hubl)

Pinaverdol (1 500)	1 oz	40 c c s
Collodion emulsion	25 ozs	1000 c c

The sensitiveness extends from the orange to the violet

PANCHROMATIC SENSITISERS (Hubl)

Pinaverdol (1 500)	3 ozs	30 c c s
Ethyl violet (1 500)	½ oz	5 c c s
Collodion emulsion	100 ozs	1000 c c s

Pinacyanol can be substituted for ethyl violet

FOR RED SENSITISING

Pinacyanol (1-1000)	3 ozs	3 c c s
Collodion emulsion	100 ozs	100 c c

FOR BLUE AND (SLIGHTLY) BLUE-GREEN SENSITIVENESS

The following sensitiser increases the sensitiveness of the collodion for ordinary work —

Canary II (sat sol) (Read Holliday, Huddersfield)	1	c c s
Emulsion	10 ozs	100 c c s

The dyed emulsion keeps well, and in half-tone work gives a sharp clean dot, but its speed is not improved

Safe-lights for Developing.

(Newton & Bull.)

Yellow safe light for wet plates, bromide paper.

	Per sq. cm.	Grs. per sq. in. (approx.)
Tartrazine	1 mgm.	1/10
Or brilliant yellow	0.5 mgm.	1/20
Or naphthol yellow	1 mgm.	1/10
Or auramine	2 mgm.	1/5

Red safe light for ordinary plates.

	Per sq. cm.	Grs. per sq. in. (approx.)
Tartrazine	1 mgm.	1/10
Rose bengal (or fast red) .	0.5 mgm.	1/20

Safe light for Ortho plates.

The above screen is combined with one containing

Methyl violet ..	0.5 mgm.	1/20

The red screen transmits light from the end of the visible red about λ 7,000 to λ 5,900 in the yellow. The methyl violet absorbs from λ 6,500 to λ 5,000, so that the only light passing the two is the extreme red of λ 7,000 to λ 6,500, to which even the best panchromatic plates are feebly sensitive.

The dyes are dissolved in gelatine solution, which in winter should be about 8 per cent. in strength and about 10 per cent. in summer. About 20 c.c.s should be allowed for every 100 sq. cm. of glass, i.e., about 20 minims per sq. in. The dyes are added, most conveniently from stock solutions, in quantity to give the proportions stated above in the filters.

DEVELOPERS AND DEVELOPMENT.

(*Arranged alphabetically.*)

The following are a few of the typical formulæ generally employed for development, etc. A much greater variety will be found in the section headed "Developing Formulæ of the Principal Plate-makers."

(pp 785, &c) In these as in other formulæ in the ALMANAC "sodium sulphite" without qualification refers to the "cryst" and "recryst" sulphite, and "sodium carbonate" to the crystallised carbonate

It should be noted also that the metric weights are not equivalents of the British item for item, but that the two formulæ give a solution of the same composition

Adurol.

TWO-SOLUTION

A	Adurol	85 grs	19 5 gms
	Sodium sulphite	1¾ ozs	175 gms
	Water .	10 ozs	1000 c c s
B	Potass carbonate	1¼ oz	125 gms
	Water ..	10 ozs	1000 c c s

Adurol possesses a character intermediate between pyro and the long-factor developers, metol, amidol, etc

For studio work and snap-shots take 1 part of A, 1 part of B

For time exposures outdoor take 1 part of A, 1 part of B, 1 part of water

ONE-SOLUTION (CONCENTRATED)

Sodium sulphite	4 ozs	400 gms
Potass carbonate	3 ozs	300 gms
Water	10 ozs	1000 c c s

When all are dissolved add —

Adurol	½ oz	50 gms

For studio work and snap-shots take 1 part with 3 parts of water

For time exposures outdoor take 1 part with 5 parts of water

Amidol.

A normal developer consists of –

Amidol	2–3 grs	4 5–7 0 grms
Sodium sulphite	25 grs	57 5 gms
Water to ..	1 oz	1000 c c s

The mixed developer will keep well in solution for about a week, or sometimes longer, if its concentration does not exceed that given above. It must be made up with freshly dissolved sulphite, as this salt does not keep well in solution for more than a few weeks. A sodium sulphite solution that has had added to it some potassium metabisulphite will, however, keep well for a very long period, and by the addition of dry amidol a fresh developer can be rapidly prepared when required.

Make the following stock neutralised sulphite solution:—

Sodium sulphite	4 ozs.	200 gms.
Potassium metabisulphite	½ oz.	25 gms.
Water to	20 ozs.	1000 c.c.s.
For use take		
Amidol	2–3 grs.	4.5–7.0 gms.
Stock sulphite sol.	100 min.	200 c.c.s.
Water to	1 oz.	1000 c.c.s.

Azol

The following are the instructions for the use of this single-solution developer:—

For Plates and Films.

Normal exposures	Azol	30 mins.	¼ oz.
	Water	to 1 oz.	to 6 ozs.
Under-exposures	Azol	15 mins.	¼ oz.
	Water	to 1 oz.	to 8 ozs.
Over-exposures,	Azol	30 mins.	¼ oz.
	Water	to 1 oz.	to 4 ozs.

For stand development.—Azol, 1 oz.; water, 100 ozs.

For tank development.—Azol, ¼ oz.; water, 40 ozs. Time of development of films at 60° F., 20 to 30 minutes. This solution may be used several times in succession.

For lantern slides and transparencies.—Azol, 25 mins.; potass. bromide 10%, 5 mins.; water to 1 oz.

For bromide papers.—Azol, 15 mins.; water to 1 oz. A few drops of 10% solution potass. bromide may be added if the whites are grey.

For gaslight papers.—Azol, 40 mins.; water to 1 oz. Add a few drops of 10% solution of potass. bromide, sufficient to keep the whites clear.

Edinol.

ONE-SOLUTION.

For soft portrait negatives

Sodium sulphite	5 ozs	250 gms
Edinol	96 grs	11 gms
Sodium carbonate	2 ozs	100 gms
Water	20 ozs	1000 c c s

For contrasty negatives.

Acetone sulphite (Bayer)	288 grs	33 gms
Sodium sulphite ..	4 ozs	200 gms
Edinol .	96 grs	11 gms
Potassium carbonate	2 ozs	100 gms
Potassium bromide	48 grs	5 5 gms
Water .	20 ozs	1000 c c s

The ingredients should be dissolved strictly in the order given

Edinol tends to contrast when a carbonate is used to softness when a caustic alkali is employed A developer of the latter class contains, in one ounce, edinol, 2½ grs, caustic soda, 1¼ gr and sodium sulphite, 10 grs

Eikonogen.

A	Sodium sulphite	2 ozs	100 gms
	Eikonogen	½ oz	25 gms
	Distilled water	20 ozs	1000 c c s
B	Potass. carbonate	1½ ozs	75 gms
	Distilled water	20 ozs	1000 c c s

For use, mix equal volumes of A and B

ONE SOLUTION

Sodium sulphite	2 ozs	100 gms
Sodium carbonate	1 oz	50 gms
Distilled water	20 ozs	1000 c c s
Eikonogen .	½ oz	25 gms

Eikonogen is a good developer for full detail without excess density in the high lights

Eikonogen-Hydroquinone.

A	Hydroquinone	40 grs	4 5 gms
	Eikonogen	120 grs	14 gms
	Sodium sulphite	480 grs	55 gms
	Citric acid	20 grs	2 3 gms
	Water to	20 ozs	1000 c c s
B	Potass bromide	5 grs	0 5 gms
	Sodium carbonate	60 grs	7 gms
	Caustic potash	30 grs	3 5 gms
	Water to	20 ozs.	1000 c c s

For use, mix in equal parts

This developer is suitable for negatives, lantern plates, and bromide papers

Ferrous Oxalate.

A Potass oxalate (neutral), 5 ozs , hot water, 20 ozs Cool, and pour off clear liquid for use

B Warm water, 20 ozs , sulphuric acid, 30 minims sulphate of iron, 5 ozs

Mix 1 oz of B with 3 to 4 ozs of A (pouring B into A, not *vice versa*).

A more powerful developer is made by dissolving commercial dry ferrous oxalate in boiling saturated solution of potassium oxalate As much as will dissolve is stirred in and the whole left to cool, after which the clear solution is poured off for use

FOR TRANSPARENCIES ON GELATINO-CHLORIDE PLATES

A	Neutral oxalate of potash	2 ozs	100 gms
	Ammonium chloride	40 grs	4 5 gms
	Distilled water	20 ozs	1000 c c s
B	Sulphate of iron	4 drs	34 gms
	Citric acid	3 drs	17 gms
	Alum	2 drs	17 gms
	Distilled water	16 ozs.	1000 c c s

For black tones, mix the above in equal volume

HURTER AND DRIFFIELD'S STANDARD FERROUS OXALATE DEVELOPER

(*The Photographic Journal*, 1898.)

A	Potassium oxalate	1 part
	Water	4 parts
B	Ferrous sulphate	1 part
	Citric acid	0.01 part
	Water	3 parts
C	Potass. bromide ..	1 part
	Water	100 parts

For use take A, 100 parts; B, 25 parts; C, 10 parts. Development to be conducted at a temperature of 65° F.

The ferrous oxalate as compounded above contains in every 1000 parts:—Potassium oxalate, 185 parts; ferrous sulphate, 68.5 parts; citric acid, 0.61 parts; potassium bromide, 0.74 parts.

Glycin

ONE-SOLUTION (HÜBL)

Boiling water	4 ozs.	1000 c.c.s.
Sodium sulphite	2½ ozs.	625 gms.
When dissolved add—		
Glycin	1 oz.	250 gms.
And then in small quantities		
Potass. carbonate	5 ozs.	1250 gms.

This forms a thick cream, which must be well shaken and then diluted with water; for normal work dilute 1 oz. with 12 or 15 ozs. of water; for very soft results with 30 ozs. of water.

ONE-SOLUTION

Glycin	1 oz.	33 gms.
Sodium sulphite	2½ ozs.	83 gms.
Potass. carbonate	5 ozs.	166 gms.
Water to	30 ozs.	1000 c.c.s.

For normal exposures dilute with an equal bulk of water.

Glycin is a slow-acting developer, but perfectly free from stain. It is the best re-agent for "Stand Development" (which see).

Hydroquinone.

ONE-SOLUTION.

Hydroquinone	100 grs.	11.5 gms.
Sodium sulphite	1¼ ozs.	75 gms.
Sodium carbonate	3 ozs.	150 gms.
Water to	20 ozs.	1000 c.c.s.

May be diluted with an equal volume of water.

This formula is not so quick in action as the next one, but there is less tendency for the great density in the high-lights which is easily produced in cases of under-exposure. In all cases the temperature of the hydroquinone developer should not be allowed to fall below 60°, or the solution becomes inert.

TWO-SOLUTION (CAUSTIC SODA).

A.	Hydroquinone	160 grs.	18 gms.
	Sodium sulphite	2 ozs.	100 gms.
	Citric acid	60 grs.	7 gms.
	Potass bromide	40 grs.	4.5 gms.
	Water to	20 ozs.	1000 c.c.s.
B.	Caustic soda (stick)	160 grs.	18 gms.
	Water to	20 ozs.	1000 c.c.s.

For use.—A, 1 oz.; B, 1 oz.; water, 2 ozs.

ONE-SOLUTION (WITH FORMALINE).

Hydroquinone	130 grs.	15 gms.
Sodium sulphite	6 ozs.	300 gms.
Formaline	3 drs.	20 c.c.s.
Water to	20 ozs.	1000 c.c.s.

A slow developer, giving great clearness in the shadows, and plenty of density in high-lights, and specially suitable for line-subjects.

Imogen Sulphite.

A.	Imogen sulphite	1 oz.	83 gms.
	Distilled water (warm)	12 ozs.	1000 c.c.s.
B.	Sodium carbonate	1 oz.	500 gms.
	Water	2 ozs.	1000 c.c.s.

For correct exposure, A, 2 ozs.; B, 2 ozs.; water, 4 ozs. For under exposure or soft negatives, A, 1 oz.; B, 3 ozs.; water, 4 ozs. For

over-exposure, A, 2 ozs., B, 2 ozs., water, 3 ozs., potassium bromide, 40 per cent. solution, 1 oz.

Kachin.

A	Kachin	160 grs. (Avoirdupois)	9 gms.
	Sodium sulphite	2¼ ozs.	62.5 gms.
	Water to	20 ozs. (fl.)	500 c.c.s.
B	Sodium carbonate	2 ozs.	50 gms.
	Water to ..	20 ozs. (fl.)	500 c.c.s.

For use take equal parts of A and B. More diluted developer gives softer results. The solutions should be used at a temperature of 60 to 65 degrees F. Assuming exposure to have been correct, with this solution the image commences to appear in about one minute, and when full density is required development is completed in from four to six minutes. Softer effects are obtained in from three to four minutes. No restrainer is really necessary, but in the case of over-exposure the use of a few drops of 5 per cent. solution of ordinary borax is recommended.

Kachin is almost free from staining properties, and is excellent in its clean development of stale plates, on which it does not produce the common iridescent markings.

Metol.

ONE SOLUTION (HAUFF).

Metol	150 grs.	16 gms.
Sodium sulphite	2¼ ozs.	125 gms.
Sodium carbonate	3½ ozs.	175 gms.
Potass. bromide	16 grs.	2 gms.
Water .	20 ozs.	1000 c.c.s.

For portraits, take stock solution, 1 oz., water, 1 oz. For landscapes, stock solution, 1 oz., water, 2 ozs.

Metol gives delicate negative with great detail and little density unless development is greatly prolonged. See "Factorial Development."

TWO-SOLUTION (HAUFF)

A	Metol	150 grs	16 gms
	Sodium sulphite	2¼ ozs	125 gms
	Water to	20 ozs	1000 c c s
B	Sodium carbonate	3½ ozs	175 gms
	Potass bromide	16 grs	2 gms
	Water	20 ozs	1000 c c s

For portraits, A, 1 oz , B, 1 oz For landscapes, A, 1 oz , B, 1 oz water, 1 oz

ONE SOLUTION (ANDRESEN)

Metol	160 grs	18 gms
Sodium sulphite	3½ ozs	175 gms
Potass carbonate	1¾ ozs	87 5 gms
Potass bromide	22 grs	2 5 gms
Water	20 ozs	1000 c c s

For use, take 1 part of developer to 3 of water

TWO SOLUTION (ANDRESEN)

A	Metol	160 grs	18 gms
	Sodium sulphite	3½ ozs	175 gm
	Water	20 ozs	1000 c c
B	Sodium carbonate	3½ ozs	175 gms
	Water	60 ozs	3000 c c

One part of A is mixed with 3 parts of B, potass bromide being added as required for prevention of fogging

Metol-Hydroquinone.

ONE-SOLUTION

Metol	35 grs	4 gms
Sodium sulphite	2 ozs	100 gms
Hydroquinone	50 grs	5 7 gms
Sodium carbonate	1½ oz	75 gms
Distilled water to	20 ozs.	1000 c c s

This is mixed with an equal volume of water at the time of use.

TWO-SOLUTION

A	Metol	40 grs	4 5 gms
	Hydroquinone	50 grs	5 7 gms
	Sodium sulphite	120 grs	14 gms.
	Potass bromide	15 grs	2 gms
	Water to	20 ozs	1000 c c s
B	Sodium carbonate	½ oz	25 gms
	Water .	20 ozs	1000 c c s

Mix in equal parts

In cold weather it is best to increase the proportion of metol to hydroquinone -to say, 60 grs metol, 30 hydroquinone

Ortol.

ORTOL-SODA

A	Ortol	140 grs	15 gms
	Potass metabisulphite	70 grs	9 gms
	Water, cold	20 ozs	1000 c c s
B	Sodium carbonate	2½ ozs	125 gms
	Sodium sulphite	3½ ozs	175 gms
	Potass bromide	10 20 grs	1 1-2 3 gms
	Water	20 ozs	1000 c c s

100 minims of 1 in 2 hypo solution may be added to solution A, and is said to brighten the shadows, but this addition is of doubtful value

In cold weather the potassium bromide may be left out

For quick development take 1 part of A and 1 part of B For slow and soft development take 1 part of A, 1 part of B, and 1 part water

Ortol solution should not be made up with sodium sulphite, otherwise red stain may be caused, nor should ammonia be used with it In other respects it closely resembles pyro

Paramidophenol.

ONE-SOLUTION

Potassium metabisulphite	6 ozs	300 gms
Distilled water .	20 ozs	1000 c c s
Paramidophenol	2 ozs	100 gms

Dissolve in the above order and add gradually—

Caustic soda or potash .	q.s.

to dissolve the precipitate first formed

For use, dilute 1 oz with from 10–30 ounces of water

Paramidophenol is non-stainless and keeps well in single solution owing probably to its preservative action on soda sulphite

TWO-SOLUTION

A	Paramidophenol hydrochloride	200 grs	23 gms
	Potassium metabisulphite	100 grs	11 5 gms
	Distilled water to	20 ozs	1000 c c s
B	Sodium sulphite .	1¼ oz	62 5 gms
	Potassium carbonate	1¼ oz	62 5 gms
	Distilled water to	20 ozs	1000 c c s

For use, mix 1 oz of A with 2 ozs of B

Pyro-Acetone

A	Pyro	1 oz	100 gms
	Sodium sulphite	4 ozs	400 gms
	Distilled water to	9 ozs	1000 c c s

Potassium metabisulphite must not be used, unless neutralised, and there should be no addition of citric acid

A normal developer consists of

A sol (pyro, 4 grs or 8 gms)	40 minims	80 c c s
Acetone	40 minims	80 c c s
Water	1 oz	1000 c c s

and is made by measuring out 40 minims of A solution, adding 40 minims of acetone and making up to 1 oz

Pyro-Ammonia.

(10 % SOLUTIONS)

A	Pyro solution as for pyro potash or pyro soda		
B	Potass bromide	1 oz	100 gms
	Distilled water to	9 ozs	1000 c c s
C	Liquid ammonia (0 880)	1 oz (fl)	100 c c .
	Distilled water to	9 ozs	1000 c c s

To make a normal developer, take A, 20 minims , B, 10 minims C 30 minims , water to 1 oz or if no bromide is used, A, 20 minims , C, 10 minims , to water, 1 oz or in metric measures, A, 2 c c s , B, 1 c c , C, 3 c c water to 1 oz

Pyro-Soda Developer.

Make up two solutions according to the following formulæ—

A	Neutral sulphite solution	14 ozs	700 c c s
	Pyro (sublimed or cryst)	160 grs	18 gms
	Water to make	20 ozs	1000 c c s
B	Soda carbonate ..	4 ozs	200 gms
	Water to make .	20 ozs	1000 c c s

Take A, 1 part B, 1 part water, 2 parts

The following is the neutral sulphite solution—

Soda sulphite cryst	4 ozs	200 gms
Potass metabisulphite	½ oz	25 gms
Water to	20 ozs	1000 c c s

This developer will produce negatives free from pyro stain, and 4 to 6 minutes' development at normal temperature with full exposure will yield soft negatives full of detail and well suited to enlarging The advantages of the developer are its cleanliness and the extraordinary keeping qualities of the A solution

When stronger negatives are required, the developer can be made up by taking equal parts of A, of B, and of water, or equal parts of A and B alone can be used, thus giving a developer containing 4 grains pyro to the ounce

The mixed solution can be used for several plates in succession if a little extra time is given for development in each case

It will be noticed that in making up A solution 14 parts of sulphite solution must be added to 6 parts water, which is equivalent to adding 7 parts to 3 If less sulphite solution is taken, a slightly quicker developer is obtained, but the result will show pyro stain in the lights

It is as well to use freshly made neutral sulphite solution for making up the A solution if absolute freedom from stain is desired

Pyro-Caustic Soda.

(VALENTA)

Pyro	220 grs	25 gms
Soda sulphite	3¼ ozs	162 5 gms
Water to	20 ozs	1000 c c s
Caustic potash	100 grs	11 5 gms
or		
Caustic soda	70 grs	8 5 gms
Water to	20 ozs	1000 c c s

Take A, 1 oz , B, 1 oz , water, 1 oz

The above is a quick-acting and cheap developer, resembling metol in its characteristics

Pyro-Metol.

A	Pyro	80 grs	9 2 gms
	Metol	70 grs	8 gms
	Potass. metabisulphite	180 grs	20 0 gms
	Potass bromide	30 grs	3 5 gms
	Water to	20 ozs	1000 c.c s
B	Soda carbonate	3 ozs	150 gms
	Water to	20 ozs	1000 c c s

For normal exposures, use equal parts For under-exposures, increase the proportion of B and add water.

Pyrocatechin.

TWO SOLUTION

A	Pyrocatechin	175 grs	20 gms
	Sodium sulphite	1½ oz	75 gms
	Water	20 ozs	1000 c c s
B	Potass. carbonate	2½ ozs	125 gms
	Water	20 ozs	1000 c c s

Equal parts are mixed together

ONE-SOLUTION

Sodium sulphite	5 ozs	250 gms
Water	20 ozs	1000 c c s
Caustic soda	260-300 grs	30 0-34 5 gms
Pyrocatechin	400 grs	46 gms

The chemicals are dissolved in this order, and the stock solution kept well corked It is diluted with 20 times its volume of water for use

Rodinal.

Rodinal is a concentrated liquid preparation of para-amido phenol, sold also in solid form The following are instructions for the use of the liquid -

For general work, development of negatives Rodinal, 1 oz, water, 25 ozs A stronger solution e g, Rodinal, 1 oz, water, 10 oz, can be used to give density in a shorter time

For over-exposures it is convenient to keep the following stock solution --

Rodinal	1 oz	30 c c s
Potass bromide	150 grs	10 gms
Water	1 oz	30 c c s

And add a few drops to the 1 30 rodinal developer in cases of over exposure

For under-exposures -Rodinal, 1 oz water, 30, 40, or 80 oz

Stand Development.

Glycin is a very suitable developer for this purpose, and the following directions are given by Hubl for the use of the formula (given on another page) for a concentrated solution

Normal developer - Stock sol, 1 oz, water, 80 to 90 oz, potass bromide, 10 per cent sol, 80 minims

In this solution a properly exposed plate should make its appear ance in 15 or 20 minutes, and obtain full density in several hours

For under-exposures —Stock sol, 1 oz, caustic soda sol (10%) 1 oz, water, 50 oz, warmed to 75 degrees F

For over-exposures —Stock sol, 1 oz, potass bromide, 10% sol 1 oz, water, 25 ozs

Factorial Development.

The total time of development (found by trial to give a certain amount of contrast) divided by the time in which the image first appears is the "factor" of a developer.

The following 'Watkins' factors" are abstracted from the instructions from the "Watkins' dark room clock and factorial calculator":—

SUGGESTED FACTORS.

	Grs. pyro to oz.	Factor		Grs. pyro to oz.	Grs. brom. to oz.	Factor
	1	18		1	¼	9
Pyro-soda	2	12	Pyro-soda	2	½	5
without	3	10	with	3	¾	4½
bromide	4	8	bromide	4	1	4
	5	6½		8	2	3½

Pyro-acetone about double the above figures.

	Factor		Factor
Adurol (Schering or Hauff)	5	Ilford pyro-soda (minimum pyro)	5½
Amidol (2 grs. per oz.)	18	Imogen sulphite	6
Cristoid developer and film	30	Imperial pyro-soda	4½
Diamidophenol	60	Imperial standard (pyro-metol)	9
Diogen	12	Kachin	10
Edinol	20	Kodak powders	18
Eikonogen	9	Metol	30
Glycin (carb. soda)	8	Metol-hydroquinone	14
Glycin (carb. pot.)	12	Ortol ..	10
Hydroquinone (min. B)	5	Pyrocatechin	10
Hydroquinone (max. B)	4½	Quinomet	30
Ilford pyro-soda (maximum pyro)	4½	Rodinal	40

Note.—High factor developers (*e.g.*, metol and rodinal), owing to the long time which is needed for density, tend to softness. Short-factor developers (*e.g.*, hydroquinone and strong pyro-soda) tend to hardness as they quickly build up density after the image appears.

Where a factor divides evenly into 60, the product is called a divisor, and will greatly facilitate calculating the total time of development. Thus adurol has a divisor of 12 (60 divided by 5), and if the time of appearance in *seconds* is divided by 12 the result is the number of *minutes* to develop.

PYRO SODA DEVELOPERS.
With and without bromide.

	Factor		Factor
Austin-Edwards (with B)	5	Marion (with B)	4½
Barnet (with B) ..	4½	Mawson (no B)	10
Cadett (no B)	9	Paget (no B)	11
Kodak (no B)	12	Thomas (with B)	5
Edwards (with B)	4½	Wratten (no B)	11
Premier (with B) ..	4½	Wellington (normal) .	11
Gem (with B) ..	4	Wellington (studio) ..	15

Thermo Development

See under "Developers" in 'Epitome of Progress.'

Combined Development and Fixing.

Although there is not much to be said for simultaneous development and fixing on practical grounds, the following formula may be given as one of the best for the purpose

A	Kachin	150 grs	17 gms
	Sodium sulphite	3 ozs	150 gms
	Water to	20 ozs	1000 c.cs
B	Caustic soda	160 grs	18 gms
	Water to	20 ozs	1000 c.cs
C	Hypo	1 oz	560 gms
	Water to	2 ozs	1000 c.cs

Take A, 160 minims B 24 minims, C, 20 minims, water to 1 oz.
A, 32 c.cs, B 5 c.cs, C, 4 c.cs water to 100 c.cs

Restrainers.

Potassium bromide in 10 per cent solution is the most common restrainer. The dose is from one half-grain (5 minims) per ounce of developer

Ammonium citrate solution has the advantage that after it has been added to the developer density can be obtained without further fogging, though the development of detail is prevented An average dose with the pyro-ammonia developer is 6 to 10 grains per ounce (60 to 100 minims of solution made by adding ammonia, about 250 minims, to 1 ounce of citric acid dissolved in a little water until neutral, and diluting the whole to 10 ounces)

Potassium borotartrate —10 to 30 minims of a 10 per cent solution restrain with most developers

Sodium bicarbonate acts as a restrainer, particularly with amidol developer

FIXING, & HYPO ELIMINATORS.

Acid Fixing Baths.

An excellent acid fixer is made by adding about ½ oz potass metabisulphite to each pint of fixing bath The cost is perhaps more than that of the two following baths, but the fixing solution is as good as can be made

Hypo solution (1 5)	50 ozs	1000 c.cs
To which add a mixture of		
Tartaric acid solution (1 2)	1½ oz	30 c.cs
Sodium sulphite solution (1 4)	3½ ozs	70 c.cs

Alum-Hypo Fixing Bath.

Alum (saturated solution)	20 ozs	1000 c.c.s
Sodium sulphite (saturated solution)	4–7 ozs	200—300 c.c.s
Hypo-solution (1 : 5)	20–28 ozs	1000–1250 c.c.s

Chrome Alum and Hypo Fixing Bath.

Add—

Strong sulphuric acid ..	1 dr. (fl.)	10 c.c.s
Water .	2 ozs	80 c.c.s

to—

Sodium sulphite	2 ozs	80 gms
Water	6 ozs	240 c.c.s

And pour the mixture into

Hypo	16 ozs	700 gms
Water	48 ozs	2000 c.c.s

Finally add to the above mixture

Chrome alum	1 oz	40 gms
Water	8 ozs	300 c.c.s

Hypo-Eliminators.

Peroxide of hydrogen (20 vols.)	1 dr	25 c.c.s
Water .	5 ozs	1000 c.c.s

After washing the negative well it is immersed for a couple of minutes in the solution and again rinsed in water

Where peroxide of hydrogen is not obtainable, the following may be used as a substitute —

Barium dioxide	1 oz	25 gms
Glacial acetic acid	1 oz	25 gms
Water	40 ozs	1000 c.c.s

Reduce the barium dioxide to a fine powder and add it gradually to the acid and water, shaking until dissolved A few minutes' immersion in this solution will effectually remove or destroy the last traces of hypo

PERSULPHATE

Ammonium persulphate	2½ grs	6 gms
Carbonate of soda	5 grs	12 gms.
Water	1 oz.	1000 c.c.s

PERCARBONATE

Potassium percarbonate	2½ grs	6 gms
Water .	1 oz	1000 c.c.s

PERMANGANATE

Wash the negative for one minute under the tap, and transfer to a shallow dish containing water with enough potass permanganate in it to turn it pink Remove the negative as soon as the colour goes, and keep on treating in the very weak permanganate baths until the colour is not discharged A very cheap and satisfactory process which allows of a negative being ready for drying within three minutes of fixation

Rapid Drying of Negatives.

Method I —Rinse from the hypo-bath, place in 1 50 formaline for ten minutes, wash by pouring nearly boiling water six times over the negative and dry by heat To get rid of the relief which is produced by this process the negative is rubbed with a piece of washleather moistened with alcohol

Method II —After washing in the usual way or using a hypo-eliminator, lay a piece of old fine cambric on the negative and firmly pass a roller squeegee over it The negative, with much of the water thus removed, will dry in a few minutes in a moderately warm place

Method III Soak in two successive baths of methylated spirit, and place in a current of air The present commercial spirit, owing to the mineral naphtha in it, causes a whitish scum on the surface of the film, and is not favourable to clean work

HARDENING AND CLEARING SOLUTIONS.

Hardening Baths.

Formaline	1 oz	50 c c s
Water	10 to 20 ozs	500 1000 c c s
Alum	1 oz	50 gms
Water	20 ozs	1000 c.c s
Chrome alum	1 oz	50 gms
Water	20 ozs	1000 c c s

ng Solutions.

Acid Alum

Alum	2 ozs	200 gms
Citric acid	1 oz	100 gms
Water	10 ozs	1000 c c s

Wash moderately after fixing, and immerse the negative in the above This bath is also useful for removing white scum from negatives developed with ferrous oxalate if rubbed on with cotton wool

Chrome Alum

Chrome alum	½ oz	25 gms
Hydrochloric acid	½ oz	25 c c s
or		
Citric acid	1 oz	50 gms
Water	20 ozs	1000 c c s

THIOCARBAMIDE.

Thiocarbamide ..	90 grs	10 gms
Citric acid	90 grs	10 gms
Water	20 ozs	1000 c.c.s

SODIUM HYPOCHLORITE

(*Eau de Javelle.*)

Bleaching powder	1 oz.	30 gms
Sodium carbonate	1½ oz.	45 gms

Shake up the bleaching powder with a solution of the carbonate in a little water (6 ozs. or 180 c.c.s.), and filter. Extract the residue with plain water, and again filter. The filtrate (solution of sodium hypochlorite) forms an active stain remover. It can be acidified with oxalic acid, and then discharges yellow stain still more vigorously, but with risk to the silver image.

REMOVING SILVER STAINS.

Soak the negative in

A. Potass iodide	200 grs	45 gms
Water	10 ozs	1000 c.c.

And after washing transfer to

B. Potass cyanide	300 grs.	70 gms.
Water	10 ozs	1000 c.c.

in which rub the stained part of the film with a pledget of cotton wool.

If the stain does not yield to this treatment a solution of iodine (in potass iodide) may be used in place of solution A.

A remedy for silver stains, which sometimes succeeds, is to rub with pumice powder, and place in strong hypo.

NEGATIVE INTENSIFIERS.

Mercury Intensification.

The negative is bleached in the following saturated solution of mercury bichloride:—

Mercury bichloride (corrosive sublimate)	1 oz.	62 gms
Hot water	16 ozs	1000 c.c.s

After cooling this solution and pouring off from the white feathery crystals thrown down, add—

Hydrochloric acid	30 minims	4 c.c.s

After well washing, the bleached negative is blackened in one or other of the following:—

A. Ammonia (0.880)	20 drops	20 drops
Water	1 oz	30 c.c.s

Gives great intensification and good black colour.

B Soda sulphite, 10 per cent. solution, made slightly acid with citric acid Very slightly strengthens a negative

C An alkaline developer, such as pyro-soda, pyro-ammonia, hydroquinone, or ferrous oxalate Gives about double the intensification of B

D	Schlippe's salt	200-400 grs	20 40 gms
	Water	20 ozs	1000 c c s

This solution must be made fresh, and gives great intensification

Monckhoven's

A	Bromide of potassium	10 grs	23 gms
	Bichloride of mercury	10 grs	23 gms
	Water	1 oz	1000 c c s
B	Pure cyanide of potassium	10 grs	23 gms
	Nitrate of silver	10 grs	23 gms
	Water	1 oz	1000 c c s

The silver and cyanide are dissolved in separate lots of water, and the former added to the latter until a permanent precipitate is produced The mixture is allowed to stand 15 minutes, and after filtering, forms Solution B

Place the negative in A till it is white then rinse and transfer it to solution B If the intensification has been carried too far, it may be reduced by treatment with a weak solution of hyposulphite of soda

Mercuric Iodide

Water	20 ozs	1000 c c
Sodium sulphite	4 ozs	200 gm
Mercuric iodide	90 grs	10 gms

The sulphite must be dissolved first The solution keeps well in the dark The plate needs to be rinsed only from the fixing bath, and requires to be immersed for only a few minutes in water and then for a few seconds in hypo (10 grs per oz) after sufficient intensification has been obtained Greater permanency is secured by treating instead with any non-staining developer, or, better, with 5 per cent solution of sodium sulphite

If mercuric iodide is not available the following may be used -

Mercuric chloride	50 grs	6 gms
Water	10 ozs	500 c c s

Add 10 per cent potass iodide solution until precipitate first formed is redissolved About 1½ oz (75 c c s) will be required, and, when clear, add—

Sodium sulphite	4 ozs	200 gms
Water to make	20 ozs	1000 c c s

Silver Intensifiers.

B. B. WELLINGTON'S FORMULA

Silver nitrate	120 grs	7 75 gms
Water	—	60 c c s
Add—		
Ammonium sulphocyanide	240 grs	15 5 gms
Water	3 ozs	85 c c s

This mixture is best made at the time of use, although it may be left for several weeks To prepare the intensifier, take-

Above mixture	½ oz	30 c c s
Hypo solution (1 in 4)	enough to just dissolve white ppt	
Pyro (10% sol) with sulphite	30 minims	4 c c s
Ammonia (10% sol)	40 -60 „	6- 8 c c s

Plates should be hardened with alum or formalin, for both this and the following intensifier When sufficient density is obtained the negative is fixed for a minute or two and washed

ACID SILVER

A	Pyro	15 grs	3 5 gms
	Citric acid	5- 10 grs	1 2 gms
	Water	10 ozs	1000 c c s
B	Silver nitrate	10 grs	23 gms
	Water to	1 oz	1000 c c s

About 1 oz (30 c c s) of A is poured over the plate, once or twice, about 15 drops of B solution added, and the mixture again applied Intensification now takes place and the solution is poured off and on until sufficient If intensifier becomes very thick and turbid, fresh should be mixed up When dense enough the negative is rinsed, fixed and washed

Chromium Intensifier

(*C Welborne Piper*)

	A	B	C
Potassium bichromate	5 grs	10 grs	10 grs
Hydrochloric acid (sp gr , 1 160)*	1 min	5 min	20 min
Water	1 oz	1 oz	1 oz

Bleach in A, B or C solution, wash until yellow stain is removed, and then develop with amidol

A gives intensification about equal to mercury and ammonia , B, to that of mercury and ferrous oxalate , and C, to that of mercury and sodium sulphite

The process may be safely applied after fixation if the plate is simply rinsed for a minute or so

It may be repeated several times if the first application does not give enough density

* "Commercial pure" strong acid

Copper Intensifier.

A	Copper sulphate	100 grs	230 gms
	Water	1 oz	1000 c c s
B	Potass bromide	100 grs	230 gms
	Water to	1 oz	1000 c c s

A and B are separately made up with hot water, mixed, and allowed to cool The negative is bleached in the mixture, and washed for a minute or two It is then blackened in —

Silver nitrate	45 grs	100 gms
Water (distilled)	1 oz	1000 c c s

For still greater density, the negative is well washed from silver, and an ordinary developer applied

If too dense after the silver, it can be placed in weak hypo solution (about 10 grs per oz) or weak potass cyanide (about 2 grs per oz)

Lead Intensifier.

Lead nitrate	400 grs	46 gms
Potass ferricyanide	600 grs	70 gms
Acetic acid	3 drachms	20 c c s
Water to	20 ozs	1000 c c s

This stock solution will keep for a long time in the dark The negative is bleached in it, washed once *very carefully* in 10 per cent nitric acid—the acid makes the film very tender—then in water, and darkened in —

A	Sodium sulphide	1 oz	50 gms
	Water	20 ozs	1000 c c s
Or in —			
B	Schlippe's salt	90 grs	10 gms
	Ammonia (880)	6 drachms	40 c c s
	Water	20 ozs	1000 c c s
Or in —			
C	Potass bichromate	1 oz	100 gms
	Ammonia (880)	½ oz	50 c c s
	Water	10 ozs	1000 c c s

The lead intensifier gives very great intensification, and is suited only for line-subjects

Uranium Intensifier.

A	Uranium nitrate	100 grs	23 gms
	Water	10 ozs	1000 c c s
B	Potass ferricyanide	100 grs	23 gms
	Water	10 ozs	1000 c c s

The intensifier is prepared from - A sol , 1 . B sol , 1 oz , acetic acid, 2 drachms

The plate must be perfectly free from hypo, and after intensification be washed in several changes of *still* water until the yellow stain is gone A 10 gr per oz solution of ammonium sulphocyanide removes any yellow stain, and weak ammonia or sodium carbonate removes the intensification altogether, restoring the negative to its original state A weak acetic acid bath should then be applied to the negative if the intensifier is to be again applied

NEGATIVE REDUCERS.

Farmer's

Hypo solution (1 5)	5 ozs	150 c c s
Potass ferricyanide (10%)	quant suff	quant suff

The colour is a fair indication of the strength of the reducer, it should be pale yellow, not orange and should be used weak rather than strong, since its selective action on the shadows of a negative is then less Yellow stain is due usually to the use of an acid fixing bath, or an old fixing bath, instead of clean plain hypo solution It is not easy to remove

Belitski's.

Potass ferric oxalate	150 grs,	10 gms
Sodium sulphite	125 grs	8 gms
Water	7 ozs	200 c c s

Dissolve and add--

Oxalic acid	40 to 45 grs	2 5 to 3 1 gms

and shake until the solution turns green. Then pour off from undissolved crystals and add

Hypo	1½ oz	50 gms

Instead of the ferric oxalate the following more easily obtainable chemicals can be used in the formula

Ferric chloride cryst	100 grs	6 5 gms
Potass oxalate	190 grs	12 5 gms

This reducer is stainless, and keeps well in the dark

Persulphate

Ammonium persulphate	10 to 20 grs	23 to 45 gms
Water	1 oz	1000 c c s.

A fresh solution is made at time of use A drop of sulphuric acid per 2 ozs makes the action more regular It is best also to use the reducer before the negative has dried When sufficiently reduced indeed, slightly before the negative is placed at once into 5 per cent sodium sulphite solution If much reduction has taken place it is well to fix a second time

Eder's (Mercury and Cyanide).

Potassium cyanide	20 grs	5 gms
Potassium iodide	10 grs	2 gms
Mercury bichloride	10 grs	2 gms
Water ..	10 ozs	1000 c c s

Reduction takes place slowly and is easy to control

Dissolve the mercury, then the iodide, and lastly the cyanide to dissolve the red precipitate formed. The solution reduces slowly, but is non-staining

Iodine-Cyanide.

Iodine (10 per cent sol in potass iodide sol)	30 minims	6 c c s
Potass cyanide (10 per cent sol in water)	5 minims	1 c.c
Water	1 oz	100 c c s

Bichromate.

Potass bichromate	100 grs	20 gms
Sulphuric acid	7 drs fl	40 c c s
Water	20 ozs	1000 c c s

Ceric Sulphate.

Sulphuric acid (sp gr 1 98)	20 minims	4 c c s
Water	2 ozs	200 c c s.
Dissolve in this –		
Ceric sulphate	2 oz	100 gms
And dilute to –		
Water .	10 ozs	1000 c c s

Hard negatives are placed wet in a mixture of this stock solution and nine times its volume of water Reduces contrasts Over exposed, long-developed negatives are dipped dry into a mixture of stock solution and an equal part of water and carefully watched as the action is very rapid A convenient form of the reducer is the stock solution sold by Lumière

Permanganate.

Potass permanganate, 10% solution .		10 c c s
Sulphuric acid (10% solution by volume of 1 98 acid)	5 drs	50 c c s
Water	10 ozs	1000 c c s

Applied to a wet negative gives even reduction. A dry negative receives greater reduction in the high-lights and great softening may be obtained by immersing dry negative quickly in the reducer, washing immediately, drying and re-immersing Any brown stains are removed with a 10% solution of sodium sulphite containing 2%, oxalic acid

Hypochlor and Alum.

Chrome alum	10 grs	4 gms
Eau de Javelle (See "Clearing Solutions")	½ oz	100 c c s
Water to make .	5 ozs	1000 c c s

Immerse the negative and gently rub the surface with a piece of cotton wool By confining friction with the wool to certain parts, extra reduction can be obtained

Eder's Method of Reducing Hard Negatives.

Potass bichromate	90 grs	10 gms
Hydrochloric acid	1 oz (fl)	30 c c s
Alum	1 oz	50 gms
Water	20 ozs	1000 c c s

The negative is bleached through to the back in this solution, well washed and redeveloped in any non-staining developer, such as glycin or rodinal, only up to the right degree of contrast

Baskett's (Local) Reducer.

It consists of —

Globe metal polish	2d tin
Terebene	2 ozs
Salad oil	2 „

The ingredients are to be well mixed, and strained through fine muslin two or three times to remove any coarse particles

NEGATIVE VARNISHES.

Hot Varnishes.

No 1	Sandarac	4 ozs	115 gms
	Alcohol	28 ozs	800 c c s
	Oil of lavender	3 ozs	85 c c s

This is a good varnish for retouching upon, and a tooth is easily obtained by rubbing

No 2	Seed lac	2 ozs.	50 gms
	Sandarac	2 ozs	50 gms
	Oil of lavender	½ oz	12 5 gms
	Castor oil	1 oz	25 c c s
	Alcohol	40 ozs	1000 c c s

To prepare a good surface for the retouching pencil, the negative after varnishing is dusted over with fine resin powder and rubbed up with the fingers

No 3	White hard varnish	15 ozs	150 c c s
	Rectified spirit (not methylated spirit)	20 to 30 ozs	200 to 300 c c s

This will be found a good and cheap varnish if durability is not required, as it is easily rubbed up for retouching upon and easily cleaned off Very suitable for enlarged negatives that are not to be retained.

No 4	Bleached shellac	1¼ ozs	62 gms
	Mastic	¼ oz	13 gms
	Oil of turpentine	¼ oz	13 c c s
	Sandarac	1¼ oz	62 gms
	Alcohol	20 ozs. (fl)	1000 c c s.

Tough, hard, and durable

No 5	**Sandarac**	80 ozs	160 gms
	Turpentine	36 ozs	72 c c s
	Oil of lavender	10 ozs	20 c c s
	Alcohol	500 ozs	1000 c c s

This one may also be rubbed down with powdered resin, and gives a splendid surface for retouching

No 6	Sandarac	1 oz	55 gms
	Seed lac	1½ oz	83 gms
	Castor Oil	3 drs	20 c c s
	Oil of lavender	1½ dr	10 c c s
	Alcohol	18 ozs	1000 c c s

This varnish is somewhat dark in colour

No 7	Best orange shellac	2½ ozs	125 gms
	Oil of lavender or oil of turpentine	¼ oz	13 c c s
	Methylated alcohol	20 ozs	1000 c c s

Keep in a warm place until dissolved, then add a large teaspoonful of whiting or prepared chalk, shake, set aside to clear, and then decant This is specially recommended for gelatine negatives

Cold Varnishes.

No 1	Celluloid	1 oz	10 gms
	Amyl acetate	50 ozs	500 c c s

This may be flowed over or applied with a brush to the negative, and requires no heat

No 2	Zanzibar copal	6 ozs	30 gms
	Amber (fused)	1 oz	5 gms
	Ether	60 ozs	300 c c s
	Acetone	40 ozs	200 c c s
	Chloroform	4 ozs	20 c c s
No 3	20% shellac solution	2 ozs	160 c c s
	Ammonia (0 880)	3 drs	30 c c s
	Methylated spirit	4 ozs	320 c c s

A mixture of Japanese gold size (1 part) and benzole (2 parts) forms a rather slow-drying though otherwise excellent cold varnish The surface takes the pencil well

Shellac Water Varnish

Shellac	3 ozs.	100 gms
Sodium carbonate (saturated solution)	24 ozs	800 c c s

The shellac is allowed to soak in the liquid for twenty four hours, the liquor is then poured away and replaced by an equal quantity of water, and the mixture boiled until the shellac dissolves After standing some time the liquid becomes perfectly clear and bright

Film Varnishes.

The above water varnish is suitable, or the following:—

Borax	300 grs.	30 gms.
Glycerine	300 minims	30 c.c.s.
Shellac	600 grs.	60 gms.
Water	20 ozs.	1000 c.c.s.

Boil together for about half an hour, then add

Methylated spirit	5 ozs.	250 c.c.s.

and filter.

Another good varnish for celluloid films is:—

Dammar	500 grs.	115 gms.
Benzole	10 ozs.	1000 c.c.s.

in which, after filtration, the films are immersed and then hung up to dry.

Celluloid in amyl acetate (No. [illegible] in "Cold Varnishes," [illegible]) can also be used and is an excellent varnish for film.

Retouching Medium.

Pale gum resin	200 grs.	250 gms.
Gum dammar	90 grs.	100 gms.
Gum mastic	20 grs.	25 gms.
Oil of juniper	1 [illegible]	1 gm.
Oil of turpentine	2–4 [illegible]	1000–2000 c.c.s.

The gums are powdered and added to the oils and finally enough pure asphaltum is added to give the mixture a dark amber colour when viewed through the depth of an inch.

This formula is strongly commended by Whiting in his "Retouching" as not liable to pick, rub off, or come off on after-varnishing. It takes a great deal of work.

Ground-Glass Varnish.

Sandarac	90 grs.	103 gms.
Mastic	20 grs.	23 gms.
Ether (0.720)	2 ozs.	1000 c.c.s.

Dissolve the resins in the ether and afterwards add

Benzole	½ to 1½ ozs.	120–700 c.c.s.

The proportion of the benzole added determines the nature of the matt obtained.

This varnish must be applied to the cold negative or the coating will not be matt.

Malachite green, aurantia, or asphaltum is used for tinting it green, yellow, or brown respectively (for handwork on back of negative).

Spotting Medium.

Indian ink	water colour chalk
Payne's grey	water colour chalk

Grind together with water only on a palette to match the colour of the negative.

Blocking-Out Mixtures.

No 1. Gamboge and vermilion red, or Payne's grey and vermilion, are ground together in water in equal parts with addition of a little gum water if a glossy surface is required.

No 2	Asphaltum	1 oz	100 gms
	Wax	170 grs	40 gms.
	Carbon black	80 grs	20 gms
	Turpentine	10 ozs	1000 c.c.s

Commercial "Brunswick black" is equal to and more convenient than the above mixture.

Titles on Negatives.

The usual method is to have the words forming the title set up in type and photographed on a "process" plate. The subject negative having been made with a clear margin round it, a strip of the title negative is laid down on this margin by stripping and the clear margin then filled up with "photopake" or other blocking out mixture except over the strip of title, which is made dense enough, in the first instance, to print white. If a clear portion in a landscape negative cannot be found (in cases where the title has to appear on the view), a piece must be cut out with a sharp knife.

STRIPPING.

Gelatine Glass Negatives.

(Middleton and Howcroft)

Stock solution:—

Methylated spirit	25 ozs	250 c.c.s
Water	1 oz	10 c.c.s
Glycerine	1 oz	10 c.c.s

To prepare the "stripping solution" 6 to 30 drops of commercial hydrofluoric acid are added to 1 oz (30 c.c.s) of the above. The film is cut through all round about [illegible] inch from the edge, and placed level by aid of three wedges. The "stripping solution" is spread with a strip of paper, and the loose edgings of film removed as soon as they come away without any pull whatever. The looseness of the main film is now tested by passing a waxed silk thread, stretched on a bow underneath it. If all is free, the solution is poured off, and plain stock solution poured on.

The loose film is now transferred to a glass plate, previously coated with a coating of gum, which should be so thin as to show only when the plate is moistened with the finger. As lifters of the films, "paraffin sheets" (made by soaking thin paper in hot melted paraffin for about half an hour) are used, being semi transparent and free from buckle. One is laid on the film and lightly squeegeed down. The two

are removed together in contact by slipping the blade of a penknife under the film, which is then applied to the gummed glass plate after flowing the latter with the "stock solution." Again lightly squeegee, and remove the paraffin sheet.

A less rapid solution, but one which will be safe in the case of an old or hardened negative, is:—

Methylated spirit	1 oz.	80 c.c.s.
Water	2 ozs.	160 c.c.s.
Hydrofluoric acid	60 minims	10 c.c.s.

These proportions may be slightly altered for different commercial spirits and acids.

Film Negatives.

Caustic soda	10 grs.	23 gms.
Formaline	10 minims	20 c.c.s.
Water	1 oz.	1000 c.c.s.

The celluloid negative is immersed in this solution until the film shows signs of detachment and can be rolled back with the finger. It is then placed in

Hydrochloric acid	25 minims	50 c.c.s.
Glycerine	25 minims	50 c.c.s.
Water	. 1 oz.	1000 c.c.s.

in which it is removed from its original support to a glass or other base.

WET COLLODION AND COLLODION EMULSION.

Wet Collodion.

PYROXYLINE (HARDWICH).

Sulphuric acid, 1.845	18 ozs. (fl.)	600 c.c.s.
Nitric acid, 1.457	6 ozs. (fl.)	200 c.c.s.
Water	5-5½ ozs. (fl.)	167-182 c.c.s.
Cotton-wool	300 grs.	23 gms.

Temperature, 150 degrees F. (65 degrees C.). Time of immersion ten minutes.

IODISED COLLODION.

For Acid Pyro Developer.

Ether, specific gravity 0.725	10 ozs. (fl.)	1000 c.c.s.
Alcohol, specific gravity 0.805	4 ozs. (fl.)	400 c.c.s.
Pyroxyline .	120 grs.	27 gms.
Ammonium iodide	30 grs.	7 gms.
Cadmium iodide	45 grs.	10 gms.
Alcohol (0.830)	4 ozs. (fl.)	400 c.c.s.

BROMO-IODISED COLLODION

For Iron Developer

Ether, specific gravity 0 725	10 ozs (fl)	1000 c c s
Alcohol, specific gravity 0 805	5 ozs (fl)	500 c c s
Pyroxyline	120 grs	27 gms
Ammonium iodide	40 grs	9 gms
Cadmium iodide	40 grs	9 gms
Cadmium bromide	20 grs	4 5 gms.
Alcohol (0 830)	5 ozs (fl)	500 c c s.

Thinning Collodion after Use – A mixture of sulphuric ether (0 720), 3 parts, and alcohol (0 805), 2 parts, is generally used

THE NITRATE BATH

Silver nitrate	6 ozs	75 gms
Distilled water	80 ozs (fl)	1000 c c s
Nitric acid (pure)	8 minims	0 2 c c s

Saturate with iodide of silver which may be done by coating a plate with collodion and leaving it in the bath for some hours Filter

DEVELOPER

No 1	Ferrous sulphate	4 oz	50 gms
	Glacial acetic acid	4 oz	50 c c s
	Alcohol	4 oz	50 c c s
	Water	10 ozs	1000 c c s
No 2	Ferrous ammonio-sulphate	75 grs	43 gms
	Glacial acetic acid	75 grs	43 gms
	Copper sulphate	7 grs	4 gms
	Water	4 ozs	1000 c c s
	Alcohol	4 oz	60 c c s

INTENSIFIER

Pyrogallic acid	90 grs	10 gms
Citric acid	60 grs	7 gms
Acetic acid (glacial)	1 oz	50 c c s
Water ..	20 ozs	1000 c c s

The copper intensifier (see "Intensifiers") is used for greater density, each solution being flowed over the plate with a rinse between

Positives and Ferrotypes by Wet Collodion.

BROMO-IODISED COLLODION

Ether, specific gravity 0 725	10 ozs (fl)	1000 c c s
Alcohol, specific gravity 0 805	5 ozs (fl)	500 c c s.
Pyroxyline	100 grs.	23 gms
Cadmium iodide	50 grs	11½ gms
Ammonium bromide	25 grs	5 7 gms
Alcohol, 0 830	5 ozs (fl)	500 c c s

Note -The iodides should be dissolved in the weaker spirit and the pyroxyline in the ether and stronger spirit, and the two solutions mixed

Silver Bath

Silver nitrate (recryst.)	5¼ ozs.	70 gms.
Distilled water	80 ozs. (fl.)	1000 c.cs.
Nitric acid (pure)	½ dr.	0.8 c.c.

Saturate with iodide of silver and filter as above.

Developers

Ferrous sulphate	150 grs.	34 gms.
Glacial acetic acid	½ oz.	50 c.cs.
Nitric acid	5 minims	1 c.c.
Alcohol	½ oz.	50 c.cs.
Water	10 ozs.	1000 c.cs.

Note.—By increasing the proportion of nitric acid and decreasing that of the acetic, the image will be more metallic in appearance.

Nitrate of Iron Developer

Ferrous sulphate	1½ oz.	75 gm.
Barium nitrate	1 oz.	50 gms.
Water	20 ozs.	1000 c.cs.
Alcohol	1 oz.	50 c.cs.
Nitric acid	40 drops	4 c.cs.

The insoluble barium sulphate which is formed must be filtered out.

Fixing Solution

Potassium cyanide	½ oz.	25-30 gms.
Water	15-20 ozs.	1000 c.cs.

Developer for Collodion Transfers

Pyrogallic acid	4 grs.	9 gms.
Citric acid	3 grs.	7 gms.
Acetic acid	20 minims	41 c.cs.
Water	1 oz.	1000 c.cs.
Alcohol	20 minims	41 c.cs.

Wet Collodion for Half-Tone.

For Winter.

A.	Celloidin	190 grs.	21 gm.
	Ether (.720)	12 ozs.	600 c.cs.
	Alcohol (.805)	8 ozs.	400 c.cs.

For Summer.

B.	Celloidin	190 grs.	21 gm.
	Ether (.720)	10 ozs.	500 c.cs.
	Alcohol (.805)	10 ozs.	500 c.cs.

Iodizer.

Cadmium iodide	600 grs.	68 gms.
Ammonium iodide	210 grs.	24 gms.
Sodium iodide	210 grs.	24 gms.
Cadmium bromide	210 grs.	24 gms.
Alcohol	20 ozs.	1000 c.cs.

Use iodizer, 1 part, collodion, 15 parts, and set the mixture aside for at least 4 days to ripen. It should then be a bright yellow; if not, add to each ounce 1 minim of a solution of iodine 16 grs., alcohol, 1 oz.

Collodion Emulsion

PYROXYLINE FOR COLLODIO-BROMIDE OR UNWASHED EMULSION

Nitric acid, specific gravity 1.45	2 ozs. (fl.)	285 c.c.s.
Sulphuric acid, specific gravity 1.845	4 ozs.	570 c.c.s.
Water	1 oz. (fl.)	145 c.c.s.
Cotton (cleaned and carded)	100 grs.	33 gms.

Temperature, 150 degrees F. (65 degrees C.). Time of immersion 10 minutes.

FOR WASHED EMULSION

Nitric acid, specific gravity 1.45	2 ozs. (fl.)	400 c.c.s.
Sulphuric acid, specific gravity 1.845	3 ozs.	600 c.c.s.
White blotting-paper	145 grs.	66 gms.

Temperature, 100 degrees F. (38 degrees C.). Time of immersion 30 minutes.

COLLODIO-BROMIDE EMULSION

Ether, specific gravity 0.720	5 ozs. (fl.)	620 c.c.s.
Alcohol, specific gravity 0.820	3 ozs.	380 c.c.s.
Pyroxyline	50 grs.	14.5 gms.
Cadmium ammonium bromide	80 grs.	23 gms.
Zinc bromide	76 grs.	21.5 gms.

Sensitise by adding to each ounce 15 grs. of nitrate of silver dissolved in a few drops of water and 1 drachm of boiling alcohol. This is suitable for slow landscape work or for transparencies.

WASHED EMULSION (FOR TRANSPARENCIES)

Ether, specific gravity 0.720	5 ozs. (fl.)	620 c.c.s.
Alcohol, specific gravity 0.820	3 ozs.	380 c.c.s.
Pyroxyline or papyroxyline	60 grs.	17 gms.
Cadmium ammonium bromide	100 grs.	29 gms.
or		
Zinc bromide	96 grs.	27.5 gms.
Hydrochloric acid (specific gravity 1.2)	8 minims	2 c.c.s.

Sensitise with 20 grs. of silver nitrate to each ounce (4.3 grs. to each 100 c.c.s.), dissolved in a minimum of water with 2 drachms (13 c.c.s.) of boiling alcohol. Allow to stand for two or three days.

N.B.—In the last formula the emulsion, after being allowed to ripen for the time stated, should be poured into a dish and allowed to become thoroughly dry. The mass of dry emulsion is then washed to remove all the soluble salts, and is then again dried and redissolved in equal parts of ether and alcohol, at the rate of from 20 to 24 grs. to the ounce of solvents.

WELLINGTON'S COLLODIO BROMIDE EMULSION FORMULA

Pyroxyline	30 grs	23 gms
Ether	12 drs	500 c c s
Alcohol	12 drs	500 c c s

To bromise, add 30 grs (33 gms) bromide ammonium dissolved in 45 minims (31 c c s water), to which 4 drachms (170 c c s) of alcohol are afterwards added, 50 grs (33 gms) of nitrate of silver dissolved in a drachm (4½ c c s) of water are then added After washing and drying, the pellicle is dissolved in 1¼ oz (58 c c s) of ether, and the same of alcohol

Developer

An excellent developer for collodion emulsion is the following, worked out by the Bolt Court School of Photo-Engraving, London —

Glycin	190 grs	17 gms
Sodium sulphite	1 oz	40 gms
Potass carbonate	2 ozs	80 gms
Water to	25 ozs	1000 c c s

INTENSIFYING SOLUTION FOR COLLODION EMULSION

Silver nitrate	60 grs	70 gms
Citric acid	30 grs	35 gms
Nitric acid	30 minims	35 c c s
Water	2 ozs	1000 c c s

To each drachm of a three-grain solution of pyrogallic acid add 2 or 3 minims of the above, and apply until sufficient density is attained

HUBL'S CHLOR-BROMIDE COLLODION EMULSION

Special for Colour Work

A Silver nitrate	480 grs	50 gms
Hot distilled water	1 oz	50 c c s
Dissolve and add		
Alcohol	2 ozs	100 c c s
Nitric acid	6 drops	10 drops
Shake well, and add to		
4 per cent collodion	10 ozs	500 c c

Shake till any precipitated pyroxyline is redissolved, and then add in small quantities

Zinc bromide (pure anhydrous)	307 grs	32 gms
Absolute alcohol	2¾ ozs	128 c c s
Shaking between each addition, then add		
Nitric acid	24 minims	1 5 c c s
Hydrochloric acid	24 minims	1 5 c c s

This should be gently warmed before adding to the collodion Allow to stand for twenty-four to thirty-six hours, or till the emulsion appears a greyish-violet by transmitted light, then add

Zinc chloride (pure anhydrous) ..	77 grs	3 2 gms

or sufficient to convert the whole of the uncombined silver nitrate into chloride, which can be tested for with potassium chromate It

is advisable to dissolve the zinc chloride in about four times its volume of acid The emulsion should then be precipitated by pouring into plenty of water, the threads collected and shaken up with alcohol and drained, and then dissolved in

Absolute alcohol	10 ozs	500 c c s
Ether, washed	10 ozs	500 c c s

PLAIN AND ALBUMEN PAPERS.

Plain Paper

Prepare the plain paper with

Ammonium chloride	60 80 grs	14- 18
Sodium citrate	100 grs	23 gms
Sodium chloride	20 30 grs	4 5—7 gms
Gelatine	10 grs.	2 gms
Distilled water	10 ozs	1000 c c s

—

Ammonium chloride	100 grs	23 gms
Gelatine	10 grs	2 gms
Water	10 ozs	1000 c c s

The gelatine is first swolled in cold water and then dissolved in hot water, and the remaining components of the formula are added The solution is filtered and, when still warm, the paper floated upon it for three minutes

The salted paper is sensitised upon a neutral 45-grain silver bath

PLATINUM TONING BATH

Potass chloroplatinite	4 5 grs	1 gm
Water	10 ozs	1000 c c s
Nitric acid	2 3 drops	5 10 drops.

Albumen Paper.

SILVER BATH

Silver nitrate	600 grs	140 gms
Distilled water	10 ozs	1000 c c s

The bath is made just acid with nitric acid, requiring three or four drops per 10 ozs

TONING BATHS

No 1	Gold chloride	1 gr	0 3 gm
	Sodium acetate	30 grs.	6 gms
	Water	8 ozs	1000 c c s

This must not be used till one day after preparation It keeps well and gives warm, rich tones

No. 2	Gold chloride	15 grs	1 gm
	Water	4 ozs	120 c.c.s

Add lime water until a piece of red litmus paper, placed in the solution, is turned blue. Then add

Calcium chloride, fused	120 grs	7.7 gms
Water to make	7½ ozs	115 c.c.s

This solution is diluted with 15 times its volume of water to make the toning bath; it can be used over and over again by addition of stock solution.

PRESERVATIVE FOR SENSITISED ALBUMEN PAPER

Sensitise the paper in the usual bath, drain well, and when superficially dry float the back of the paper for twenty minutes on a solution of

Citric acid	1 oz	33 gms
Water	30 ozs	1000 c.c.s

To Prevent Blisters on Albumen Prints

Before wetting the prints immerse them in methylated spirit, then wash and tone as usual.

GELATINE P.O.P.

Emulsion Formulae.

BARKER'S

Gelatine (Nelson's No. 1 and Coignet's, equal parts)	175 grs	80 gms
Ammonium chloride	18 grs	8 gms
Rochelle salts	50 grs	23 gms
Silver nitrate	75 grs	34 gms
Alcohol	4 drs	160 c.c.
Water	5 ozs	1000 c.c.

Heat to 100 degrees F. (38 degrees C.), and allow to remain at this temperature after all is dissolved for ten minutes, after which proceed in the usual way.

VALENTA'S

A	Silver nitrate	480 grs	32 gms
	Citric acid	120 grs	8 gms
	Hot water	5½ ozs	160 c.c.s
B	Gelatine	1440 grs	96 gms
	Ammonium chloride	42 grs	2.8 gms
	Water	24¾ ozs	700 gms
C	Tartaric acid	42 grs	2.8 gms
	Sodium bicarbonate	21 grs	1.4 gms
	Alum	27 grs	1.8 gms
	Water	5 ozs	140 c.c.s

Allow the gelatine to swell in the water and melt by the aid of heat, and add the chloride Mix B and C at 50 degrees C, and in yellow light add A, heated to the same temperature, in small quantities, shaking thoroughly, and allow the emulsion to ripen for a short time at from 40 degrees to 50 degrees C and then filter For matt surface papers the gelatine should be reduced to 754 grs or 80 gms

The above formula give vigorous brilliant prints, but for soft negatives a harder printing emulsion is obtained by adding from 0 05 to 0 1 per cent of calcium bichromate solution, this can be made by dissolving 480 grs or 25 gms of pure chromic acid in 4 ozs or 100 c c s of distilled water, and adding sufficient pure chalk (calcium carbonate) to make the solution cloudy The solution should then be filtered, and the filter washed with distilled water up to 4 ozs or 100 c c s

Nelson's gelatine	340 grs	112 gms
Alum	15 5 grs	5 gms
Water	6½ ozs	900 c c s
Rochelle salts	15 5 grs	3 5 gms
Ammonium chloride	11 grs	5 gms
Heat to 50 degrees C, and add		
Silver nitrate	115 grs	37 5 gm
Citric acid	62 grs	20 gms
Water	1 oz	100 c c

Gold Toning Baths.

SULPHOCYANIDE

Gold chloride	24 grs	0 3 gm
Ammonium sulphocyanide	30 grs	3 5 gms
Water	20 ozs	1000 c c

It is necessary for this and all sulphocyanide baths to ripen The best method of mixing is to boil the water and to dissolve the gold in one half and the sulphocyanide in the other Then pour the former into the latter stirring all the time, and use when cool If cold water is used, the mixture should be allowed to stand 12 hours

FORMATE

Gold chloride	1 gr	0 12 gm
Sodium bicarbonate	2 grs	0 23 gm
Sodium formate	8 grs	0 9 gm
Water	20 ozs	1000 c c s

The prints must be immersed in a 10 % solution of salt and water before using this bath

TUNGSTATE

Sodium tungstate	30 grs	3 5 gms
Sodium carbonate	1 gr	0 12 gm
Gold chloride	1 gr	0 12 gm
Water	10-20 ozs	500 1000 c c s

CONCENTRATED SULPHOCYANIDE

(*Buhler's Formula.*)

A	Distilled water	1 oz	150 c c s
	Gold chloride	15 grs	5 gms
B	Strontium chloride	150 grs	50 gms
	Distilled water	⅔ oz	100 c c s
C	Potassium sulphocyanide	80 150 grs	25-50 gms
	Distilled water	1½ oz	250 c c s

Heat B to boiling, and add A (heated to 150 degrees F) in small doses Bring C to boiling, and allow to cool to 205 degrees F, and add the hot mixture of A and B in four or five lots with constant stirring, cool and filter If a precipitate forms, reheat to nearly boiling, wash the filter with ½ oz (100 c c s) water, and add this latter to the total bulk The bath is diluted with 10 times its volume of water for use.

THIOCARBAMIDE

Gold chloride	4 grs	0 25 gm
Distilled water	1 oz	25 c c s

Add, to dissolve precipitate first formed sufficient of

Thiocarbamide	90 grs	1 gm
Distilled water	10 ozs	50 c c s

About ¾ oz (1½ to 15 c c s) will be needed Next add

Citric acid	8 grs	0 5 gm

and

Distilled water to	35 ozs	1000 c c

and finally

Salt	160 grs	10 gms

The prints should be thoroughly washed *before* as well as after fixing

SHORT STOP FOR GOLD TONING

A weak solution of sodium sulphite (5 grs per oz) at once arrests the action of a gold toning bath

SALT BATH

A short immersion of prints in the following bath prior to the first washing favours even toning and prevents spots and stains from rusty tap water :—

Salt	2 oz	100 gms
Sodium carbonate	1 oz	50 gms
Water	20 oz	1000 c c s

If prints are to be toned in the platinum bath the carbonate should be omitted.

Platinum Toning Baths.

PHOSPHORIC ACID

Potass chloroplatinite	4 grs	0 45 gm
Phosphoric acid (sp gr 1 12)	⅔ oz (fl)	35 c c s
Water to	20 oz	1000 c c s

CITRIC ACID

Potass chloroplatinite	4 grs.	0·45 gm.
Sodium chloride (salt)	10 grs.	1·5 gms.
Citric acid	50 grs.	5·8 gms.
Water to	20 oz.	1000 c.c.

HADDON'S FORMULA

Platinum perchloride	3 grs.	0·2 gm.
Sodium formate	100 grs.	6·5 gms.
Formic acid	30 minims	1·8 c.c.
Water to	35 oz.	1000 c.c.s.

SHORT STOP FOR PLATINUM TONING

A weak solution of sodium carbonate (10 grs. per oz.) instantly arrests the toning action of a platinum bath.

FOR BLACK TONES

Tone in (*Valenta*)

Potass chloroplatinite	2½ to 10 grs.	0·5 to 2 gm.
Metaphenylene-diamine	2½ to 10 grs.	0·5 to 2 gm.
Water	10 oz.	1000 c.c.s.

having first washed the prints well.

Another method is to print deeply and immerse the prints in

Salt	1 oz.	25 gms.
Sodium bicarbonate	80 grs.	9 gms.
Water	20 oz.	1000 c.c.s.

then wash well and tone in a borax gold bath to a purple red. Again well wash and tone in the phosphoric platinum bath.

FOR RED

(*Valenta*)

Uranium nitrate	10–20	1–2 gms.
Thiosinamine	90 grs.	10 gms.
Water	20 ozs.	1000 c.c.

The prints are well washed, finally in water acidulated with acetic acid, and then toned. They are afterwards fixed, or can be toned to sepia brown in the combined bath.

GOLD PLATINUM (One Solution)

Citric acid	90 grs.	10 gms.
Salt	90 grs.	10 gms.
Potass chloroplatinite	4·8 grs.	½–1 gm.
Gold chloride	4·8 grs.	½–1 gm.
Water	20 ozs.	1000 c.c.s.

Twice the amount of water may be used if the bath acts too quickly. If the proportion of gold to platinum is increased the tone is warmer. The prints must be well washed before fixing.

Combined Baths.

VALENTA'S.

Hypo	8 ozs.	400 gms.
Ammonium sulphocyanide	1 oz.	50 gms.
Lead nitrate	175 grs.	20 gms.
Alum	350 grs.	40 gms.
Water to	20 ozs.	1000 c.c.s.

Dissolve the hypo in the water, add the sulphocyanide, then add the alum dissolved in a little water, and also the lead, and add to the hypo. Heat the mixture to 120° F. for ten minutes, allow to cool. For use take:—

Stock solution (as above)	10 ozs.	100 c.c.s.
Water	10 ozs.	100 c.c.s.
Gold chloride (from stock sol.)	3½ grs.	0.23 gm.

ALKALINE TONING AND FIXING.

Gold chloride	2 grs.	0.23 gm.
Lead nitrate	10 grs.	1.2 gm.
Chalk	½ oz.	25 gms.
Hypo	4 ozs.	200 gms.
Water	20 ozs.	1000 c.c.s.

Shake the solution well, allow to settle, and use the clear portion.

Reducer for Over-Printed Proofs.

A.	Ammonium sulphocyanide	10
B.	Potass. ferricyanide	10

A, 5 ozs.; B, 4 ozs.; water, 24 ozs.

Developing P.O.P.

DIRECT PROCESS WITH ACID DEVELOPER.

Hydroquinone	16 grs.	1.85 gms.
Citric acid	40 grs.	4.6 gms.
Sodium acetate	1 oz.	50 gms.
Water	20 ozs.	1000 c.c.s.

Immerse the dry prints in the developer, and, after development, wash in plenty of water for ten or fifteen minutes, then tone in the usual way.

Pyro (Blacklock).

A.	Pyro	40 grs.	4.6 gms.
	Tartaric acid	40 grs.	4.6 gms.
	Water	20 ozs.	1000 c.c.s.

Will keep three or four weeks.

B.	Potass. bichromate	1/16 gr.	0.009 gm.
	Water	16 ozs.	1000 c.c.s.

B is best made up from a stock solution of 1 gr. per ounce, adding ½ dr. of it to 16 ozs. of water. To develop, mix equal parts of A and B.

Six or seven inches of magnesium ribbon burnt close to the frame will suffice for the exposure.

The fixing bath is:—

Hypo	3½ ozs.	160 gms.
Lead acetate	200 grs.	23 gms.
Water	20 ozs.	1000 c.c.s.

in which the prints lose very little.

PAGET "BROMIDE" PROCESS.

The prints are immersed in 10 per cent. potass. bromide solution for five or ten minutes, washed and developed with the following:—

A.	Hydroquinone	40 grs.	4.5 gms.
	Sodium sulphite	160 grs.	18 gms.
	Water to	20 ozs.	1000 c.c.s.
B.	Potass. bromide	2¾ ozs.	135 gms.
	Sodium carbonate	2 ozs.	100 gms.
	Water to	20 ozs.	1000 c.c.s.
C.	Potass. cyanide	[illegible]	25 gms.
	Water	20 ozs.	1000 c.c.s.

For average negatives mix A, ½ dr., B, 1 dr., C, 20 minims, water ½ oz.

For flat negatives (greater contrast), A, 5 drs., B, 1 oz., water, 5 drs.

For hard negatives (softer results), A, 7 drs., B, 1 oz., water, 1 dr.

The cyanide solution is used as above in quantity sufficient to keep the backs of prints clean.

Glazing P.O.P.

A polishing medium to be applied to glass or ferrotype before squeegeeing the print is:—

Beeswax	20 grs.	45 gms.
Turpentine	1 oz.	1000 c.c.s.
or		
Spermaceti wax	20 grs.	45 gms.
Benzole	1 oz.	1000 c.c.s.

a few drops of which are rubbed on with a piece of flannel, and the glass afterwards polished with silk rag or chamois leather.

ENAMEL COLLODION.

Soluble gun cotton	50 grs.	14 gms.
Alcohol	4 ozs.	500 c.c.s.
Sulphuric ether	4 ozs.	500 c.c.s.

Glass plates cleaned with French chalk are coated with the above, and as soon as coating has set, dip under prints, which are waiting face down in water. Prints are withdrawn, squeegeed, and when half dry given a backing paper. (For both gelatine and collodion prints.)

COLLODIO-CHLORIDE P.O.P.

Emulsion Formula.

(Valenta.)

1.	Strontium chloride	154 grs.	10 gms.
	Lithium chloride	77 grs.	5 gms.
	Water	500 minims	30 c.c.s.
	Alcohol (absolute)	930 minims	55 c.c.s.
2.	Silver nitrate	400 grs.	20 gms.
	Water	500 minims	30 c.c.s.
	Alcohol	1000 minims	60 c.c.s.
3.	Citric acid	77 grs.	5 gms.
	Alcohol	675 minims	40 c.c.s.
	Glycerine	92 grs.	6 gms.

In a bottle capable of holding 1000 parts pour 350 parts of 3 per cent. collodion and add gradually 15 parts of No. 1. Then in the dark room add almost drop by drop 60 parts of No. 2, shaking well after each addition, then add 50 parts of No. 3 and 50 parts of ether. This collodion is suitable for normal negatives, but more contrast can be obtained if 0.1 to 0.4 per cent. calcium chromate solution is added. By reducing the amount of pyroxyline in the above formula the emulsion is more suitable for matt surface paper.

Gold Toning Baths.

Borax Acetate.

Borax	90 grs.	10 gms.
Sodium acetate	90 grs.	10 gms.
Gold chloride	2½ grs.	0.3 gm.
Water	20 ozs.	1000 c.c.s.

Sulphocyanide.

Ammonium sulphocyanide	90 grs.	10 gms.
Gold chloride	2½ grs.	0.3 gm.
Water	20 ozs.	1000 c.c.s.

For bluish-black tones.

Sulphocyanide-Acetate.

Ammonium sulphocyanide	35 grs.	4 gms.
Sodium acetate	¾ oz.	45 gms.
Gold chloride	5 grs.	0.6 gm.
Water	20 ozs.	1000 c.c.s.

Is made up one hour before using, preferably from stock solutions of the substances. With sodium tungstate, instead of the acetate, gives fine chestnut tones.

The maker's formulæ should be studied in connection with the above baths as papers differ considerably in the quantity of gold required in the toning solution.

Platinum Toning Baths.

The phosphate formula given below under "Gold Platinum Toning" is suitable for the production of the warm brown and sepia tones, which are given by the platinum baths alone Others are —

Citric acid	45 grs	5 gms
Potass chloroplatinite	4 grs	0 5 gm
Water	20 ozs	1000 c s
and		
Lactic acid (specific gravity 1 21)	25 grs	3 gms
Potass chloroplatinite	4 grs.	0 5 gm
Water	20 ozs	1000 c c s

SALT-BICARBONATE BATH

The following is used between washing and toning with the platinum bath as a means of removing free silver, and bringing the prints into a state of regular neutrality

Salt	¼ o	25 gms
Sodium bicarbonate	45 grs	5 gm
Water	20 ozs	1000 c

Gold-Platinum Toning.

For Black Tones

Wash in several changes, and tone the shadows to a brown (when seen by transmitted light) in the following

Borax	90 grs	10 gms
Gold chloride	2 grs	0 2 gm
Water	20 ozs	1000 c c s

This bath is ready within a few minutes of mixing It is conveniently made just before washing the prints The quantity of borax is adjusted to the working If the lighter tones disappear, add more borax, if the prints lack brilliance, add gold After a ten-minute wash, transfer to the platinum bath, which may be strong or weak, the only difference being that a larger number of prints may be treated together in the weaker bath

Stock solution.

Potass chloroplatinite	30 grs	7 gms
Phosphoric acid (specific gravity 1 12)	5 drs	30 c c s
Water to make	20 ozs	1000 c c s

This may be made up to 60 ozs at once, or added little by little to water, as the prints are passed through a few at a time

The prints are next washed in about eight changes of water (to the fifth or so of which it is well to add a little of bicarbonate of soda to neutralise traces of acid) before fixing

For Warm Sepia Tones.

The prints are washed in three changes of warm water and placed in :—

Ammonia	1 dr.	6 c.c.s.
Warm water	20 ozs.	1000 c.c.s.

until they become lemon yellow. They are then again washed in three changes of water and toned for about one minute in the gold borax bath above.

For Red Chalk Tones.

The prints are washed in a couple of changes of water and placed for about half an hour (until they become orange yellow) in

Salt	1 oz.	50 gms.
Water	20 ozs.	1000 c.c.s.

After which they are washed for about one minute and toned, for a few seconds only, in the borax bath above.

For Violet Tones.

Print deeply from the negatives and tone until the colour desired is reached in :—

Hydrochloric acid	6 ozs.	300 c.c.s.
Gold chloride	10 grs.	1.2 gm.
Water to make	20 ozs.	1000 c.c.s.

After which wash thoroughly and fix in 5 per cent. hypo. Less acid in the above bath tends to bluish-violet, more to violet purple.

Combined Baths.

Collodion papers, although not generally so suitable for use with the combined bath, may in many cases be toned in it. The Valenta formula (see "Gelatine P.O.P." above) is suitable, also the following (Kurz):—

Water	20 ozs.	1000 c.c.s.
Hypo	5 ozs.	250 gms.
Ammonium sulphocyanide	240 grs.	28 gms.
Alum	70 grs.	7.5 gms.
Citric acid	70 grs.	7.5 gms.
Lead nitrate	90 grs.	10 gms.
Lead acetate	90 grs.	10 gms.
Gold chloride	3½ grs.	0.4 gm.

It is turbid when first made, but clears after a few days.

BROMIDE AND GASLIGHT PAPERS.

The following developers are a few only of the standard. The "Makers' Formulæ" should be consulted.

Amidol.

Sodium sulphite	650 grs.	74 gms.
Potass. bromide	10 grs.	1.2 gm.
Water	20 ozs.	1000 c.cs.
When dissolved add		
Amidol	50 grs.	5.7 gms.

This developer will not keep more than three days.

See also the formulæ given under "Negative Developers."

The most convenient and economical method of using amidol developer for bromide papers is to make up a 10 per cent. stock solution of sodium sulphite, and add 5 grs. potassium bromide to each 10 ozs. solution. For use add 4 grs. dry amidol to each ounce stock solution, and dilute with an equal bulk of water.

Metol.

A.	Metol	100 grs.	11.5 gms.
	Sodium sulphite	2 ozs.	100 gms.
	Potass. bromide	12 grs.	1.4 gm.
	Water	20 ozs.	1000 c.cs.
B.	Potass. carbonate	2 ozs.	100 gms.
	Water	20 ozs.	1000 c.cs.

For use take 3 ozs. of A and 1 oz. of B.

For gaslight papers use half the quantity of water in above formula.

Metol-Hydroquinone.

Metol	8 grs.	1 gm.
Hydroquinone	30 grs.	3.5 gms.
Sodium sulphite	¾ oz.	37.5 gms.
Sodium carbonate	¾ oz.	37.5 gms.
10 % solution of potass. bromide	20 minims	2.5 c.cs.
Water	20 ozs.	1000 c.cs.

For gaslight papers make up above formula with 10 ozs. of water.

Rodinal.

Rodinal	100-150 minims	6-9 c.cs.
Water	10 ozs.	300 c.cs.
10 % solution of potass. bromide	20 minims	1 c.c.

Ortol.

A	Ortol	120 grs	14 gms
	Potass metabisulphite	60 grs	7 gms
	Water	20 ozs	1000 c c s
B	Sodium sulphite	4 ozs	200 gms
	Potass carbonate	1 oz	100 gms
	Potass bromide	20 grs	2 3 gms
	Water	20 ozs	1000 c c s

Use equal parts of A and B

For gaslight papers use half the quantity of water given in this

Ferrous Oxalate.

A	Sulphate of iron	5 ozs	250 gms
	Sulphuric acid	30 minims	3 c c s
	Warm water to	20 ozs	1000 c c s
B	Potass oxalate (neutral)	5 ozs	250 gms
	Potass bromide	10 grs	1 2 gm
	Warm water to	20 ozs	1000 c c

For use add 1 oz of A to 4 ozs of B, not vice versa

After development and without washing, immerse the prints for two minutes in acid bath pour off and repeat

ACID BATH

Glacial acetic acid	1 dr	6 c c s
Water .	20 ozs	1000 c c s

Then wash thoroughly to remove last trace of acid

Clearing Bath.

To remove yellow stain from bromide prints, the following is suitable

Alum (saturated solution)	10 ozs	1000 c c s
Hydrochloric acid	3 drs	10 c c

Reducer for Bromides.

Over-developed prints are best treated in a weak iodine-cyanide reducer made from (A) 10% solution of iodine in potass iodide and (B) 10% potass cyanide solution Take —

A	30 minims	2 c c s
B	10 minims	0 6 c c
Water .	2 ozs	60 c c s

Adding more of A and B if necessary.

Strong Prints from Flat Negatives.

The prints are fully exposed and over developed, fixed and washed. They are then placed in the following iodine bath until whites are strongly blue, and then fixed for five minutes.

IODINE BATH.

Potass iodide	30 grs.	7 gms.
Iodine	3 grs.	0.7 gm.
Water	10 oz.	1000 c.c.s.

If not sufficiently heightened the print may be washed and the process with bleaching bath and hypo repeated.

Hypo-Alum Toning.

Hot water	20 ozs.	1000 c.c.s.
Hypo	2½ oz.	125 gms.
Dissolve and add		
Alum	½ oz.	25 gms.

This solution should not be filtered, and it works better as it becomes older; it may be strengthened from time to time with a little fresh solution.

The best results are obtained by keeping the bath hot, or as warm as the emulsion will stand, say 100 to 120 degrees F. In this bath prints will tone in 30 to 40 minutes. When this toning bath is to be employed the use of the alum bath after fixing is absolutely essential. Moreover, the prints should not, in this case, be subjected to a prolonged washing, but should only be slightly rinsed before being dried.

A new bath tends to reduce the prints rather more than an old one. When toned the print should be placed in a tepid solution of

Water	70 ozs.	1000 c.c.
Alum	2 ozs.	30 gms.

and then washed thoroughly.

Sulphide Toning.

A	Ammonium bromide	100 grs.	11 gms.
	Potass ferricyanide	300 grs.	35 gms.
	Water	20 ozs.	1000 c.c.
B	Sodium sulphide (pure)	300 grs.	35 gms.
	Water	20 ozs.	1000 c.c.

Bleach the fixed and washed print in A solution. Wash for a few minutes in water, and then immerse in B solution until toned. The print is then well washed and dried.

Copper Toning

A	Copper sulphate	60 grs	7 gms
	Potass. citrate (neutral)	240 grs	28 gms
	Water	20 ozs	1000 c.c.
B	Potass. ferricyanide	50 grs	6 gms
	Potass. citrate (neutral)	240 grs	28 gms
	Water	20 ozs	1000 c.c.

Use equal parts of each. Warm black to red chalk tones are obtained.

Platinum Toning.

Not for Gaslight Prints.

Potass. chloroplatinite	12 grs	0.8 gm
Mercuric chloride	6 grs	0.4 gm
Citric acid	54 grs	3.4 gms
Water	6 ozs	170 c.c.

This bath should be made up fresh for use from stock solutions. Gives warm sepia tones, with slight staining of high-lights. For cold sepia tones and absence of staining add 30 minims 10 per cent. solution potassium bromide to above. Wash well after toning.

Uranium Toning

A	Uranium nitrate	90 grs	10 gms
	Water	20 ozs	1000 c.c.
B	Potass. ferricyanide	90 grs	10 gms
	Water	20 ozs	1000 c.c.

Use equal parts of A and B, and add 20 minims of glacial acetic acid to each ounce of mixture. The prints must be free from hypo. After toning wash in several changes of *still* water till the high-lights are clear. Washing in running water will remove the toning in patches. Citric acid (10 grs. per oz.) or oxalic acid (5 grs. per oz.) instead of acetic is an aid to pure whites. This bath intensifies the image.

Green Tones.

Vanadium chloride	20 grs	1 gm
Ferric chloride	10 grs	0.5 gm
Ferric oxalate	10 grs	0.5 gm
Potassium ferricyanide	20 grs	1 gm
Oxalic acid (sat. sol.)	2¼ ozs	60 c.c.s
Water to	20 ozs	1000 c.c.s

Dissolve the vanadium salt in hot hydrochloric acid and a little water. Add the ferric chloride and oxalate to the oxalic acid solution diluted with half the water, then add the ferricyanide dissolved in water, stirring well, and finally the vanadium. Tone till the prints turn blue, and then wash till they are green. Yellowish stain of the whites is removed by a weak (2 grs per oz.) solution of ammonium sulphocyanide.

Blue Tones.

10% solution ferric ammonium citrate	2 ozs.	10 c.c.s.
10% solution potassium ferricyanide	2 ozs.	10 c.c.s.
10% solution acetic acid	20 ozs.	100 c.c.s.

The well washed prints are immersed in this bath until the desired tone is given. Then well wash until high lights are clear. This bath intensifies the image.

Gold Toning.

Ammonium sulphocyanide	30 grs.	2 gms.
Chloride of gold	2 grs.	0.13 gm.
Boiling water	4 ozs.	110 c.c.s.

Use as soon as cool. Place the wet print face upwards on a sheet of glass, squeegee into contact, blot off superfluous moisture, and paint the above bath on with a broad flat brush; when the desired tone is reached wash well and dry. This considerably improves the colour of greenish or rusty black prints, and if allowed to act for some time bluish tones are obtained.

Practically all the above toning solutions can be employed for lantern plates.

Line Drawings from Bromide, Gaslight, or P.O.P. Prints.

After outlining the subject in waterproof Indian ink the image in

Thiocarbamide	[illegible]10 grs.	20 gms.
Nitric acid	1 drs. (fl.)	25 c.c.s.
Water	20 ozs.	1000 c.c.s.

Iodine sol. (10 per cent. in potass. iodide sol.)	30 minims.	6 c.c.
Potass. cyanide (10 per cent. sol. in water)	5 minims.	1 c.c.
Water	1 oz.	100 c.c.s.

THE CARBON PROCESS.

Sensitising Solutions.

Potass bichromate	1 oz	35-50 gms
Water	20-30 ozs	1000 c c s
Liquor ammonia (0 880)	60 minims	6 c c s

A longer immersion in the weaker solution is practically equal to a shorter one in the stronger bath

If the tissue is squeegeed on a glass plate after sensitising, light or heavy squeegeeing also modifies its sensitiveness by removing more or less of the solution If the tissue be squeegeed on to a ferrotype plate, and allowed to dry upon it, the drying may be done in the light of an ordinary room The face of the tissue is then protected from light, dust and injurious vapours

The following has been recommended -

B	Potass bichromate	1 oz	20 gms
	Water	50 ozs	1000 c c s
	Citric acid	¼ oz	5 gms

Liquor ammonia q s to change the tint of the solution to a lemon yellow This bath is suitable for thin negatives, i e, those lacking in contrasts, and the tissue sensitised in it will keep longer than that sensitised in the former solution The tissue, however is much less sensitive, and with vigorous or contrasty negatives, such as are best suited for carbon work, it is apt to yield prints that are hard, through the washing away of the more delicate tones in the development

Waxing Solutions.

FOR CARBON PRINTS, OR FOR REMOVING COLLODION FILMS

No 1	Beeswax	20 grs	10 gms
	Benzole rect No 1	4 ozs	1000 c c

FOR FLEXIBLE SUPPORTS (ALTERNATIVE)

No 2	Yellow resin	180 grs	42 gms
	Yellow beeswax	60 grs	14 gms
	Rectified spirits of turpentine	10 ozs	1000 c c s

Formalin Hardening Bath

Alum	1 oz	50 gms
Water (1 pint)	20 ozs	1000 c c s

Gelatine Solutions.

For transferring carbon pictures from flexible support to ivory, opal, glass, &c

Nelson s No 1 gelatine	1 oz	50 gms,
Water	1 pint	1000 c c s
Chrome alum, dissolved in 2 ozs		
(100 c c s.) hot water	12 grs	1 4 gm

For coating drawing papers for the single transfer process—

Nelson's No 1 gelatine	1 oz	50 gms
Water	1 pint	1000 c c s
Chrome alum, dissolved in 2 ozs (100 c c s) water	20 grs	2 5 gms

Apply with a brush

Note —In adding a solution of chrome alum to one of gelatine, both solutions should be at a fairly high temperature 130 degrees to 160 degrees F

SUBSTRATUM FOR CARBON TRANSPARENCIES

Nelson's No 1 gelatine	1 o	37 gms
Water	20 o	1000 c c s
Potass bichromate	12 gr	1 4 gm

Well cleaned plates are coated with this and dried, when they are fully exposed to light, which will render the coating insoluble

To Remove Bichromate Stains from the Fingers and Nails after Sen itising

Apply dilute ammonia to the parts until the stains disappear then well wash the hands with warm water and soap

THE BROMOIL PROCESS.

C. Welborne Piper's Formula.

The bromide enlargement must be fully exposed and developed using a slow acting amidol developer for preference and it must be thoroughly fixed washed, and dried It is then bleached in

Ozobrome solution	4 parts
Potash alum, 10 , solution	4 parts
Citric acid, 10 , solution	1 part
Water to make	20 parts

It is washed and then immersed in sulphuric acid (1 part to 20 water) for from 2 to about 5 minutes, again washed by soaking for a few minutes, and then fixed for 2 or three minutes in

Hypo	3 ozs
Soda sulphite	4 "
Water to make	20 ozs

After this it is washed again and then pigmented like an ordinary oil print The solutions and washing water used should not be under 60 deg or over 70 deg F , and the preparation of the print should not occupy longer than 20 minutes

The ozobrome solution used is that specially supplied for bromoil by the Ozobrome Company

PLATINUM PRINTING.

Sensitisers for Cold Bath Papers (Hubl).

Stock Solutions.

Standard Iron Solution.—In glass measure about 3 in. diameter and 12 ins. high (marked to show a volume of 85 c.c.s.), place 52 gms. powdered iron ammonium alum, and add about 20 c.c.s. ammonia (0.880) and 20 c.c.s. water. Stir up the alum powder with a glass rod and allow to stand several minutes, with frequent stirring. The whole should smell slightly of ammonia; if it does not a little more is added. The measure is then filled with water, the precipitate of ferric hydroxide stirred up, the glass rod removed, and the ppt. left to settle. The clear liquid is poured [illegible], fresh water poured on, and the stirring and settling repeated until the solution no longer colours red litmus paper blue. Powdered oxalic acid (21.5 gms.) is then dusted on the ppt., after pouring off the last washing water, and (in yellow light from this point) stirred in until the mixture clears. It is poured into a 100 c.c. measure, and diluted (with rinsings from the cylinder) to 100 c.c.s. Process occupies three to four hours.

Lead-Iron [illegible] Solution.—Dissolve lead acetate (10 gms.) in warm water (100 c.c.s.) and add oxalic acid (4 gms.) dissolved in a little water. A white precipitate of lead oxalate is produced, and is filtered, washed, and shaken up, with Standard Iron Solution in proportion of 1 gm. per 100 c.c.s. Finally, filter.

Oxalic-Gelatine Solution.—Soak gelatine (2 gms.) in water (20 c.c.s.), and add oxalic acid (½ gm.). Warm before use. Keeps only a day or two.

Stock Platinum Solution.—Potash chloroplatinite, 1 gm.; water, 6 c.c.s.

Mercury Citrate Solution.—Dissolve yellow mercuric oxide (1 gm.) in water, 20 c.c.s.; citric acid, 5 gms.; warm and filter.

Sensitisers.

The quantities are for a 20 by 30 sheet. Water is added for medium (2 to 3 c.c.s.) and for rough (3 to 8 c.c.s.) paper.

A.	Lead-iron solution	4.5 c.c.s.
	Stock platinum solution	3 c.c.s.

For black tones on gelatine-sized Rives papers.

B.	Lead-iron solution	4.5 c.c.s.
	Stock platinum solution	3 c.c.s.
	Oxalic-gelatine solution	1 c.c.

For blue-black tones on arrowroot sized papers.

For more brilliant prints 5 to 10 drops of 10% solution of sodium chloroplatinate are added to either of the above.

Sepia Paper Sensitisers.

HOT DEVELOPMENT.

Standard iron solution	6 c.c.s
Stock platinum solution	4 c.c.s
Mercuric chloride (1-20 solution)	0.2 to 1 c.c.
Sodium chloroplatinate (10% solution)	2 to 10 drop

COLD DEVELOPMENT.

Standard iron solution	8 c.c.s
Stock platinum solution	4 c.c.s
Mercury citrate solution	1 to 4 c.c.s
Sodium chloroplatinate (10% solution)	2 to 5 drops

For rough paper 2 to 4 c.c.s of water are added.

Cold Bath Developers.

Potass. oxalate	2 ozs.	100 gms.
Potass. phosphate	1 oz.	50 gms.
Water	20 ozs.	1000 c.c.

FOR SEPIA TONES ON COLD BATH BLACK PAPER.

A	Potass. oxalate	2 ozs.	20 gms.
	Water	15 ozs.	150 c.c.
B	Potass. citrate	160 grs.	23 gms.
	Citric acid	250 grs.	39 gms.
	Mercuric chloride	95 grs.	14 gms.
	Water	15 ozs.	1000 c.c.

Equal parts of A and B, used slightly warm. The prints are afterwards fixed in acid baths of one third the usual strength.

Another Formula.

Prepare the following solutions:—

1	Potass. oxalate	4 ozs.	250 gms.
	Distilled water	16 ozs.	1000 c.c.s
2	Cupric chloride	124 grs.	35 gms.
	Distilled water	8 ozs.	1000 c.c.s
3	Mercuric chloride	1 oz.	62 gms.
	Distilled water	16 ozs.	1000 c.c.
4	Lead acetate	32 grs.	18 gms.
	Distilled water	4 ozs.	1000 c.c.s

Mix 12 parts of No. 1 with 4 parts No. 2, then add 4 parts No. 3 and 1 part No. 4 and heat till the precipitate first formed is redissolved. The solution should be heated to 175 degrees F., and the prints developed in it in the usual way and treated to the usual acid clearing baths, then immersed in ammonia solution (about 10 minims per oz.) for five minutes, and washed and dried.

Developers for Sepia Paper.

Hot Bath.

Potass oxalate		100 gms.
Potass phosphate		50 gms.
Citric acid	180 grs.	20 gms.
Potass chloride	90 grs.	10 gms.
Water	20 ozs.	1000 c.c.s.

Cold Bath.

Potass oxalate	2 to 6 oz.	100 to 300 gms.
Oxalic acid	90 grs.	10 gms.
Water	20 ozs.	1000 c.c.s.
or,		
Potass oxalate	1½ to 6	70 to 300 gms.
Potass phosphate	260 grs.	30 gms.
Oxalic acid	90 grs.	10 gms.
Water	20 ozs.	1000 c.c.s.

Recovering Over-exposed Prints.

Immerse for about two minutes in the oxalate developer. Transfer for one second to a bath of 1 to 20 hydrochloric acid. Return to the developer, and treat as usual.

Intensifier for Platinum Prints.

A	Sodium formate	45 grs.	100 gm.
	Water	1 oz.	1000 c.c.
B	Platinum perchloride	10 grs.	1 gm.
	Water	1	45 c.c.s.

Add 15 minims each of A and B to 2 ozs. of water (5 c.c.s. to 100 c.c.s.)

Restoring Yellowed Prints.

Shake up bleaching powder with about five times its weight of water, pass through a sieve, and to the portion which passes through add a little weak hydrochloric acid—enough to give the mixture a faint chlorine smell. This solution removes the yellow (iron) stain from platinum prints.

Cleaning Soiled Prints.

Alum (one teaspoonful) is dissolved in about 8 ozs. of water, and mixed in a basin with a handful of flour to a cream-like consistency. This mixture is applied to the platinum print with a soft brush, and washed off in running water.

Platinum Residues.

Exhausted developers (the acid baths will not repay recovery) are mixed in a large jar, with zinc and hydrochloric acid (spirits of salt will do). A dirty chalk-like precipitate is accumulated, and the clear liquor is thrown away. The platinum is precipitated in the mud, and the latter, when enough has accumulated, is sent to the refiners, after being drained from water as much as possible on a linen cloth.

Waste prints, clippings from paper, etc., should be sent as they are or burnt to an ash in a place free from draught, such as a biscuit tin with a row of holes about half way up. They should not be mixed with the wet residues, as the two require different treatment for the extraction of the metal.

IRON PRINTING PROCESSES.

Ferro-Prussiate Sensitiser.

A	Ferric ammonium citrate (green)*	110 grs	250 gms
	Water	1 oz	1000 c.c.s
B	Potass ferricyanide	40 grs	90 gms
	Water	1 oz	1000 c.c.s

Mix in equal parts, keep in the dark, and filter just before use.

Solution for Writing Titles on removing blue lines from blue prints, etc.—Potass oxalate, 75 grs. per oz., 170 gms. per 1000 c.c.s.

Brightening the Colour.—Blue prints are improved in colour by a final bath of 2½ per cent. alum solution, 3 per cent. oxalic acid, or 1 per cent. hydrochloric acid.

The Kallitype Process.

SENSITISER.

Ferric oxalate	75 grs	170 gms
Silver nitrate	30 grs	70 gms
Distilled water	1 oz	1000 c.c.s

The ferric oxalate is shaken up with the hot water and a grain or two of oxalic acid added to get it into solution. After filtering the silver is added and the solution stored in the dark.

DEVELOPERS.

For Black Tones.

Borax	2 ozs	100 gms
Rochelle salt	1½ ozs	75 gms
Water	20 ozs	1000 c.c.s
Potass. bichromate sol. (1%)	15 to 18 drs	90 to 115 c.c.s

For Purple Tones.

Borax	½ oz	28 gms
Rochelle salt	2 ozs	100 gms
Water	20 ozs	1000 c.c.s
Potass. bichromate sol. (1%)	15 to 18 drs	90 to 115 c.c.s

* If the ordinary brown citrate be used, the formula should contain 80 grs. (158 gms.) and the ferricyanide should be increased to 60 grs. (137 gms.)

For Sepia Tones

Rochelle salt	1 oz.	50 gms
Water	20 ozs	1000 c c s
Potass bichromate sol (1 ,)	8 10 drs.	50 60 c c s

For Black Tones

Sodium acetate	3 ozs	150 gms
Water	20 ozs	1000 c c s

From this developer prints must be passed into a bath of potas oxalate (15 %) before fixing

FIXING SOLUTION

Hypo	1 oz	200 gms
Ammonia (0 880)	120 minims	12 c c s
Water	20 c	1000 c

Sepia Paper.

A	Ferric ammonium citrate (green)	110 grs	250 gms
	Water	1 oz	1000 c c s
B	Tartaric acid	18 grs	40 gms
	Water	1 oz	1000 c c s
C	Silver nitrate	45 grs	100 gms
	Water	1 oz	1000 c c s
D	Gelatine	30 grs	70 gms
	Water	1 oz	1000 c c s

Equal parts (say 1 oz of each) of these solutions are mixed as follows - D is rendered just fluid on a water bath, A and B added, and lastly C, a few drops at a time The prints are fixed in 1 50 hypo

One-Solution Sepia Sensitiser.

Silver nitrate	55 grs	3 5 gms
Water	4-5 drs	15-20 c c s

Add ammonia drop by drop to just redissolve the white precipitate, and then a little sulphuric (or citric) acid to just remove the odour of ammonia Then add -

Ferric ammonium citrate (green)	40 gr	2 5 gm
Water	6 drs	25 c c

This solution keeps in the dark, and is used like the four solution mixture

Pellet Process.

A	Pure gum arabic	4 ozs	200 gms
	Water	20 ozs	1000 c c s
B.	Ferric ammonium citrate	10 ozs	500 gms.
	Water	20 ozs	1000 c c s
C	Ferric chloride (crystallised)	10 ozs	500 gms
	Water	20 ozs	1000 c c s

Add 8 vols of B, then 5 vols of C to 20 vols of A, in small d with constant stirring

The prints are developed on 10 per cent solution of potass ferrocyanide and "fixed" in 1 25 sulphuric acid (specific gravity 1 98)

The Ferro-Gallic Process.

Gum arabic	60 grs.	135 gms.
Warm water	1 oz.	1000 c.c.s.

When dissolved add the following in the order given:—

Tartaric acid	8 grs.	18 gms.
Salt	36 grs.	81 gms.
Ferric sulphate	40 grs.	90 gms.
Ferric chloride	60 grs.	135 gms.

The developer for the prints is:—Alum and gallic acid 1 part of each, water 80 parts.

MOUNTANTS.

Starch Paste.

Pure starch is mixed with a very small proportion of cold water to form a very stiff mass. It should be so stiff that it is stirred with difficulty. Perfectly boiling water is then poured in, about 12 ozs. for every ounce of starch. On stirring the mixture will jellify without being boiled; but if it does not it is brought to the boil, cooled, the skin taken off, and the paste used on day of making.

Gelatine.

For mounting prints in optical contact with glass.

Nelson's No. 1 gelatine	4 ozs.	50 gms.
Water	16 ozs.	200 c.c.s.

Soften the gelatine in the water, liquefy on the water bath, and add a little at a time and stirring rapidly:—

Methylated spirit	5 ozs.	30 c.c.s.
Glycerine	1 oz.	6 c.c.s.

The mountant is used hot. A piece of ground glass is dipped in hot water, drained, and the mountant brushed over. The print is then laid face up on the pasted surface and rubbed gently in contact with a piece of paper, being then removed and pressed down on its mount.

Dextrine Paste.

Best white dextrine	1 lb.
Cold water	to make stiff paste
Water	10 ozs.
Oil of wintergreen	1 dr.

Mix the dextrine and water together in small doses of each, so as to ensure a mixture free from lumps and clots. Dilute with the further quantity of water, add the oil, and just bring the whole mixture to the

boil, when it should be like clear gum Pour into pots, cover up, and in from 12 to 24 hours it will be set to a hard and white paste of great adhesive power The dextrine must be the best white, inferior dextrine remains treacly on cooling

Starch-Gelatine.

A	Bermuda arrowroot	8 ozs	200 gms
	Water	4 ozs	100 c.c.s
B	Nelson's No 1 soft gelatine	360 grs	10 gms
	Water	6½ ozs	800 c.c.s

The gelatine is first softened in the water and A and B are then mixed together and boiled for a few minute To the cold mixture are stirred in

Methylated spirit	5 ozs	250 c.c.s.
Carbolic acid (liquid)	25 minims	3 c.c.s

This is a good cold paste, which sticks and keeps fairly well

Liquid Gelatine.

Gelatine	1 oz	100 gms
Water	6 ozs	600 c.c.s
Chloral hydrate	1 oz	100 gms

The gelatine is dissolved in the water by aid of heat, and the chloral hydrate added After digesting for a short time the adhesive liquid is neutralised with a little sodium carbonate solution

Gum-Dextrine.

Picked white gum arabic	½ oz	65 gms
Dextrine	2¼ ozs	280 gms
Liquid ammonia	4 drops	50 c.c
Carbolic acid	1 dr	15 c.c
Water	8 ozs	1000 c.c.s

The gum is powdered in a mortar and mixed intimately with the dextrine, and rubbed with 2 ozs of water until a smooth mixture is obtained The remainder of the water is added, and the whole boiled for 10 minutes The ammonia and carbolic acid are added when cold This mountant keeps well for months, and is smooth in working and of great adhesiveness

Shellac Mountant.

A strong solution of shellac in methylated spirit, or, better, rectified spirit, is thinly applied to both mount and print, and the two coated surfaces quickly rubbed into contact A good method of fixing prints to thin mounts in albums, etc.

Affixing Paper to Metal.

Tragacanth	3 ozs	60 gms.
Gum arabic	12 ozs	240 gms
Water	50 ozs	1000 c c s
or—		
Gum arabic	1 oz	100 gms
Aluminium sulphate	45 grs	10 gms
Water	10 ozs	1000 c c s

Mounting on Glass (Opalines).

Nelson's No 2 soft gelatine	2 ozs	30 gms
Water	20 ozs.	300 c c s

The gelatine is soaked in the water, and liquefied by standing the vessel in hot water The solution is thinned down until nearly as thin as water Print and glass are immersed, removed together, and squeegeed together with flat rubber squeegee

WORKING UP, COLOURING, ETC., PRINTS.

Lubricant for Burnishing Prints.

Powdered Castile soap	20 grs	5 gms
Alcohol	10 ozs	1000 c c s

Encaustic Paste.

Purified beeswax	50 parts
Oil of lavender	30 parts
Benzol	30 parts
Gum elemi	1 part

Baskett's Formula

To the contents of a 2d tin of Globe polish add 1 oz best olive oil and 1 oz terebine Apply with soft cloth and polish

Preparing Prints for Colouring.

P.O P 's and Glossy Bromides.

Rub the prints lightly with a tuft of wool slightly moistened with artist's purified ox-gall If they have been lubricated before burnishing apply previously a little alcohol in the same way.

COLLODION PRINTS.

Fluid extract of quillaia	.	1 dr	5 c c s
Water	. ..	1 oz	40 c c s
Alcohol	. .	1 oz	40 c c s

BROMIDES

For Water Colouring

Apply ox-gall as directed for P O P, or prepare as directed below for pastel work

For Oil Colouring

If the surface is clean no preparation is needed, if otherwise give a wash of gum, starch, or gelatine, or prepare with pumice powder Also light drying oil (from the artists' colourman) may be rubbed over with a tuft of wool or the fingers It dries in about twenty-four hours, and leaves the surface of the bromide ready for painting

For working up in pastel or black and white, apply fine pumice powder with a tuft of wool, and remove with another piece of wool or a duster

Fixatif for Crayon and Pastel Work.

A	Mastic	24 grs	1 6 gm.
	Amyl acetate ..	3 ozs	85 c c s

Dissolve by agitation, and allow to stand some hours before use

B	Celluloid (film clippings free from emulsion will do)	7 grs	0 45 gm
	Amyl acetate	3 ozs	85 c c s

Dissolve by agitation Mix when both are clear, and keep in tightly corked bottle Apply with spray diffuser

Colouring Prints with Dyes.

Dissolve the aniline colour (1d packets of dye will do) in a sufficient quantity of water (from ½ to 1 oz to a 1d packet) and for glossy prints add a little gum If the work affects the gloss when finished, rub the print over with a piece of wool slightly moistened with a solution of wax in benzole

Colouring Prints with Artists' Water Colours.

The following are suitable colours those in italics are transparent, the others are semi-transparent, and all are practically permanent They are mentioned in the order of their usefulness, viz .—

Alizarin Crimson	*Olive Green.*
Alizarin Yellow	Raw Sienna
Cobalt Blue	Burnt Sienna
Bistre	*Burnt Carmine* (Purple Lake)
Madder Brown	*Purple Madder*
Alizarin Green	Viridian Green
Payne's Grey	*Sap Green*
Prussian Blue	Sepia
Aureolin.	

The following are also useful, but either cannot be classed as permanent colours (marked †) or are not transparent (marked *) — Carmine†; Light Red*, Pink, Rose, and Rose Doré Madders†, Scarlet Lake*, Ultramarine or French Ultramarine*, Indigo†, Brown Pink†, Burnt Umber*, Vandyke Brown*, Gamboge†, Naples Yellow,* Yellow Ochre*, Roman Ochre*

N B - The quality and names of the different makers vary The foregoing lists refer to those colours manufactured by Messrs Reeves and Sons, Ltd, and of "Artists' Quality"

Spotting Bromide Prints.

Mix together Payne's grey and Indian ink (the colour should match that of the film)

Spotting P.O.P. Prints

Add a little carmine to the above When mixture is dry (on the palette) work in a strong solution of gum rubbing the brush one way only, to avoid making air-bells If the prints are to be enamelled or glazed by stripping after spotting, then artists' oil colours with benzole in which gum dammar has been dissolved, or water colours, may be used with shellac water varnish (See "Negative Varnishes")

Colouring from Behind (Crystoleum).

The print (which should be albumen) is mounted with a warm solution of

Hard gelatine	20 grs	45 gms
Water	1 oz	1000 c c

containing a little salicylic acid to keep it Or with a cold mountant made by mixing the above with an equal volume of starch paste

VARNISH FOR "TRANSLUCING."

Canada balsam	5 ozs.	100 gms
Solid paraffin	2 ozs	40 gms
White wax	2 ozs	40 gms

which is melted, the picture immersed, and the whole kept as cool as possible consistent with remaining fluid

MISCELLANEOUS FORMULÆ.

Reversed Negatives by Ammonium Persulphate

A lantern or other thinly coated slow plate is placed in contact with the negative in a printing frame and a full exposure given such as would be thought advisable in making a soft positive transparency. The plate is developed with a clean working developer (*e g*, glycin)

until the shadows appear quite black on the glass side of the plate The time of development may be five times as long as for an ordinary transparency The latter is then washed and placed in a 2 per cent solution of ammonium persulphate until the silver image is seen to be removed The plate is then thoroughly washed and developed in any clean developer containing about half a grain of bromide per ounce It is then fixed and washed and dried. After the first development the operations may be done in weak daylight or artificial light The action of the persulphate should be as complete as possible, otherwise a veil is left over the negative The above is a very rapid and economical process Direct positives, but reversed from right to left, from engravings, etc, may be made in the camera by substituting bromide paper for the plate The exposure should be full and the development as above The method has this advantage, that the lines are rendered in the same degrees of black and grey as in the original, a point of some importance, since the lines in an engraving are seldom, if ever, of uniform blackness

To Recover Fogged Plates.

Potass bichromate	100 to 200 grs	11 to 22 gms
Hydrochloric acid	30 minims	3 5 c c s
Water	20 ozs.	1000 c c s

Bathe plates in above for two minutes, wash for one or two minutes in running water and dry Solution slows plates, and may be used, as above or after exposure to obtain contrast on extra-rapid plates—e g when copying black and white or other subjects

Backing Dry Plates.

Gum solution (ordinary office gum)	1 oz	100 c c s
Caramel	1 oz	100 gms
Burnt sienna, ground in water	2 ozs	200 gms
Mix and add—		
Alcohol	2 ozs (fl)	200

BACKING SHEETS FOR DRY PLATES

Gelatine	1 part	50 gms
Water	2 parts	100 c c s
Glycerine	1 part	50 c c s
Indian ink	A small addition	

Make a paste, and coat strong paper, place the prepared material face downwards on waxed glass to set Press to back of plate before putting into dark slide

The Dusting-on Process.

Best gum arabic	80 grs	5 2 gms.
White sugar	60 grs	4 0 gms
Ammonium bichromate	60 grs	4 0 gms
Water	7 ozs	200 c c s
Methylated spirit	1 oz	30 c c s

This mixture will keep for a few days only, and after the plate has been coated and exposed it is developed with finest graphite powder, collodionised, and washed.

Ink for Rubber Stamps.

Aniline red (violet)		900 grs.	210 gms.
Boiling distilled water		10 ozs.	1000 c.c.
Glycerine	about	½ oz.	60 c.c.s.
Treacle	about	¼ oz.	30 c.c.s.

Invisible Ink.

Chloride of cobalt	25 grs.	60 gms.
Distilled water	1 oz. (fl.)	1000 c.c.s.

Writing executed with this ink is most pink on paper, becoming invisible on drying. On warming the writing turns blue.

Dead Black for Wood.

Borax	30 grs.	8 gms.
Glycerine	30 minims	8 c.c.s.
Shellac	60 grs.	16 gms.
Water	8 ozs.	1000 c.c.

Boil till dissolved and add

Nigrosine W.S.	60 grs.	16 gms.

Or paint the wood first with

Cupric chloride	75 grs.	75 gms.
Potassium bichromate	75 grs.	75 gms.
Water	2¼ ozs.	1000 c.c.

and as soon as the surface dries apply

Aniline hydrochlorate	150 grs.	150 gms.
Water	2¼ ozs.	1000 c.c.s.

and wipe off any yellow powder that forms. Repeat the process till black enough, and then rub over with boiled linseed oil.

Waterproofing Solution for Wood.

Asphalt	4 oz.	400 gms.
Pure rubber	30 grs.	6 gms.
Mineral naphtha	10 ozs.	1000 c.c.

Apply with a stiff brush and give three successive coats, allowing to dry between each. The vapour from this solution is very inflammable.

Polish for Cameras, Woodwork, etc.

Linseed oil	20 oz.	400 c.c.s.
Spirits of camphor	2 ozs.	40 c.c.s.
Vinegar	4 ozs.	80 c.c.s.
Butter of antimony	1 oz.	20 gms.
Liquid ammonia	¼ oz.	5 c.c.s.
Water	¼ oz.	5 c.c.s.

This mixture is applied very sparingly with a bit of old flannel, thoroughly rubbed off with soft rags.

Blackening Brass Work.

A	Copper nitrate	200 gr	450 gms
	Water	1 oz	1000 c.c.s.
B	Silver nitrate	200 gr	450 gms
	Water	1 oz	1000 c.c.s

Mix A and B, and place the brass work (perfectly cleaned) in the solution for a few moments, heating it on removal

Varnish for Brass Work

Celluloid	10 grs	4 gm
Amyl alcohol	1 oz	100 c.c.s
Acetone	1 oz	100 c.c

Instead of this cold celluloid varnish commercial "cold lacquer" can be used

To Blacken Aluminium.

Clean the metal thoroughly with fine emery powder, wash well, and immerse in -

Ferrous sulphate	1 oz	80 gms
White arsenic	1 oz	80 gms
Hydrochloric acid	12 ozs	1000 c.c.s

Dissolve and add

Water	12 ozs	1000 c.c

When the colour is deep enough dry off with fine sawdust and lacquer

Silvering Mirrors (Martin's Method).

(*In employing the following formulæ, it should be well understood that the glass plate to be silvered must be scrupulously clean.*)

A	Nitrate of silver	175 grs.	40 gms
	Distilled water	10 ozs	1000 c.c.s
B	Nitrate of ammonium	262 grs	60 gms
	Distilled water	10 ozs	1000 c.c.s
C	*Pure* caustic potash	1 oz	100 gms
	Distilled water	10 ozs	1000 c.c.s
D	Pure sugar candy	½ oz. (avoir.)	100 gms
	Distilled water	5 ozs.	1000 c.c.s

Dissolve and add -

Tartaric acid	50 grs	25 gms

Boil in flask for ten minutes, and when cool add

Alcohol	1 oz	200 c.c.s

Distilled water, *quant. suff.* to make up to 10 ozs or 2000 c.c.s

For use take equal parts of A and B. Mix together also equal parts of C and D, and mix in another measure. Then mix both these mixtures together in the silvering vessel, and suspend the mirror face downwards in the solution

DEVELOPING FORMULÆ, ETC., OF THE PRINCIPAL PLATE AND PAPER MAKERS.

In all cases except where otherwise mentioned, crystallised sodium sulphite and carbonate are to be used

AUSTIN EDWARDS, LTD.

"Ensign" Flat and Roll-Films.

PYRO DEVELOPER

A	Pyro	1 oz	12 5 gms
	Nitric acid	30 drops	10 drops
	Or –		
	Potass metabisulphite	100 grs	2 8 gms
	Water	80 ozs	1000 c c s
B	Soda carbonate crystal	9 ozs	112 5 gms
	Soda sulphite	10 ozs	125 gms
	Potass bromide	80 grs	2 3 gms
	Water	80 ozs	1000 c c s

For use, take A, 1 part, B, 1 part

BAYER CO., LTD

Bayer Bromide Paper.

A	Edinol (cryst)	48 grs	10 gms
	Soda sulphite (cryst)	1 oz	100 gms
	Potass bromide	5 grs	1 gm.
	Water	10 ozs	1000 c c s.
B	Potass carbonate crystals	25 ozs	250 gms
	Water	50 ozs.	500 c c s

For use, take 4 ozs A, 1 oz B, and 5 ozs water.

"Pan" Paper

Water .	10 ozs	1000 c c s
Sodium sulphite (cryst)	1¼ oz	125 gms
Hydroquinone	72 grs	16 gms
Sodium carbonate (cryst)	2½ ozs	250 gms
Potass bromide	48 grs	11 gms

"Tula" and "St. Luke's" Papers.

Potass metabisulphite	48 grs	1 gm
Edinol crystals ..	24 grs	½ gm
Potass carbonate (cryst)	144 grs	3 gms
Water	10 ozs	100 c c s
Potass bromide, 10 % solution	6 drops	2 drops

The above developer, when freshly made, gives blue black tones when standing for some time, brown-black tones

BIRMINGHAM PHOTOGRAPHIC CO., LTD.

"Criterion" P.O.P.

TONING BATHS

Ammonium sulphocyanide	15 grs	1 7 gm
Gold chloride	1½ gr	0 17 gm
Water	20 ozs	1000 c c s

For Light Red Tones

Ammonium sulphocyanide	10 grs	1 1 gm
Sodium sulphite	1 gr	0 11 gm
Gold chloride	1 gr.	0 11 gm
Water . .	20 ozs	1000 c c s.

Estona (Self-Toning) Paper.

Fix, without previous washing, for 4 to 6 minutes in --

Hypo 1½ ozs. per pint for reddish-brown tones
Hypo, 3 ozs. per pint for warm purple tones
Hypo, 6 ozs per pint for deep purple tones

The addition of 2 tablespoonfuls (1 oz) of common table salt to each pint of hypo bath is an additional aid in securing pure whites.

"Criterion" Bromide Paper.

Amidol	75 grs	8 5 gms
Sodium sulphite	650 grs	74 gms
Potass bromide	4 grs	0 4 gm
Water . .	20 ozs	1000 c c s.

"Celerio" (Gaslight) Paper.

For Contrasty Effects

Potass metabisulphite	20 grs	2 3 gms
Metol	14 grs	1 6 gm
Hydroquinone	60 grs	6 8 gms
Sodium sulphite	1 oz	50 5 gms
Sodium carbonate	800 grs	91 gms
Potass bromide, 10 % solution	20 drops	30 drops
Water	20 ozs	1000 c c s

For Soft Effects

Metol	50 grs	5 7 gms
Sodium sulphite	320 grs	36 5 gms
Sodium carbonate	640 grs	73 0 gms
Potass bromide, 10 % solution	20 minims	1 8 c c
Water	20 ozs	1000 c c s

CADETT & NEALL, LTD.

"Royal Standard" Plates.

Rapid "Extra Rapid," "Special Extra Rapid," and "Ortho

Pyro Soda

A	Pyro		1 oz	12 5 gm
	Sodium sulphite		8 oz	100 gms
	Potass metabisulphite		50 grs	1 5 gms
	Potass bromide		15 grs	1 0 gm
	Water (distilled or boiled)	to	80 ozs	4000 c c s
B	Sodium carbonate		2 oz	100 gms
	Water (distilled or boiled)	to	20 ozs	1000 c c s

For studio work use, A, 1 part, B, 1 part, water, 2 parts

For outdoor work use, of A and B equal quantities

For under-exposure use more of B

For over-exposure use more of A with addition of few drops of 10 % solution of potass bromide

"Royal Standard" P.O.P.

Toning Bath for Cold Tones

A	Gold chloride	15 grs	1 gm
	Water	15 drs	54 c c s
B	Ammonium sulphocyanide	1 oz	45 5 gms
	Water	22 ozs	1000 c c

Water, 20 ozs, B, 1 oz, A (added gradually), 2 drachms

For Warm Tones

A	Gold chloride	15 grs	1 gm
	Water	15 ozs	425 c c s
B	Borax	300 grs	23 gms
	Water	30 ozs	1000 c c s

A, 1 oz , B, 2 ozs , water to 10 ozs

"Cadett" Bromide Papers.

METOL-HYDROQUINONE

For very Brilliant Prints

A	Metol	100 grs	6 gms
	Hydroquinone	50 grs	3 gms
	Sodium sulphite	2 ozs avd	20 gms
	Water to make	40 ozs (fl)	1000 c c s
B	Sodium carb (cryst) *washing* soda, select translucent pieces	1 oz avd	25 gms
	Potass bromide	60 grs.	3 gms
	Water to make	40 ozs (fl)	1000 c c s

Equal parts of A and B to make developer

"Royal Standard" Lantern Plates.

Black Tone

METOL DEVELOPER

A	Metol	200 grs	15 gms
	Sodium sulphite (cryst)	2 ozs	60 gms
	Potassium bromide	25 grs	2 gms
	Water	20 ozs	600 c c s
B	Washing soda	5 ozs	150 gms
	Water	20 ozs	600 c c.

This developer works rather slowly about 2½ to 3 minutes brilliant slides

"CHALLENGE" WORKS.

"Challenge" P.O.P.

Toning Solutions

A	Ammonium sulphocyanide	150 grs	23 gms
	Water	15 ozs	1000 c c
B	Gold chloride	15 grs	2 3 gms
	Water	15 ozs	1000 c c

A, 2 ozs B, added last, 2 ozs , water to make 20 ozs

Self-Toning "Challenge" P.O.P.

Fixing bath

Hypo	3 ozs	150 gms
Water	20 ozs	1000 c.c.s

This is used for six minutes. It is made of double strength when purple tones are desired.

"Challenge" Bromide Papers.

Amidol	50 grs	5.7 gms
Sodium sulphite	650 grs	74 gms
Potass bromide	10 grs	1.14 gm
Water	20 ozs	1000 c.c.

To be used within three days of making.

"Challenge" Gaslight Paper

Developer

Metol	6 grs	1.4 gm
Sodium sulphite	½ oz	50 gm
Hydroquinone	30 grs	6.8 gms
Sodium carbonate (cryst.)	1 oz	100 gms
Potass bromide, 10 per cent solution	30 drops	100 drops
Water	10 ozs	1000 c.c.

ELLIOTT AND SONS, LTD.

Barnet Plates.

"Barnet," "Red Seal," "Ortho" and "Medium Ortho" Plates

Pyro Stock Solution, A

Potass metabisulphite	100 grs	6.5 gms.
Pyro	1 oz	28 gms
Potass bromide	60 grs	3.9 gms
Water	8 ozs	225 c.c.s

Developer

No. 1	Solution A	2 ozs	50 c.c.s
	Water	18 ozs	450 c.c.s
No. 2	Sodium carbonate	2 ozs	100 gms
	Sodium sulphite	2¼ ozs	112.5 gms
	Water	20 ozs	1000 c.c.s

For use, take equal parts of Nos. 1 and 2. For soft negatives or portraiture, take No. 1, 1 part; No. 2, 2 parts; water, 1 part.

"Barnet," "Rocket," "Extra Rapid," "Studio," and "Ordinary" Plates, and Barnet Roll Film

A	Pyro	1 oz	12 gms
	Potass bromide	60 grs	2 gms
	Nitric acid ..	20 drops	0 5 c c s
	Water	80 ozs	1000 c c s
B	Sodium sulphite	9 ozs	112 gms
	Sodium carbonate	8 ozs	100 gms
	Water .	80 ozs	1000 c c s

For ordinary use, equal parts of Nos 1 and 2 For under-exposure add more of No 2 or dilute the developer with water For over exposure add more of No 1 or a few drops of 10 per cent solution of potassium bromide

Barnet P O P.

For Barnet "Ordinary" P O P, the A sulphocyanide solution given below is mixed with gold (16 ozs with 2 grs gold or 350 c c s (with 0 1 gm) to form the toning bath

Toning Bath for Matt P O P

A	Ammonium sulphocyanide	80 grs	2 3 gms
	Water	80 ozs	1000 c c s
B	Gold chloride	15 grs	1 gm
	Water	15 drs	60 c c s
C	(To be made up fresh every day)		
	Sulphite soda	15 grs	1 gm
	Water	15 drs	60 c c s

For use, take 16 ozs A, 2 drachms B, and 2 drachms C

A good rich brown tone takes about 3 minutes, but for colder tones toning should be carried further Judge the tone by looking on the surface of the prints

Another good bath is

Sodium phosphate	60 grs	3 4 gms
Gold chloride	2 grs	0 11 gm
Water	40 ozs	1000 c c s

Keep this bath for an hour before use, and throw it away as soon as the prints are toned, as it will not keep long

Barnet "Kiplo" (Self-Toning) Paper.

Place direct for 8 to 15 minutes in hypo, 1 oz , water, 5 ozs , or use a 1 20 salt bath for five minutes previous to above

Barnet Bromide Papers.

Metol Developer

A	Metol	400 grs	11 gms
	Sodium sulphite	8 ozs	100 gms
	Potass bromide	50 grs	1 5 gm
	Water	80 ozs	1000 c c s
B	Potass carbonate	8 ozs	100 gms
	Water	80 ozs	1000 c c s

Take 3 ozs of A and 1 oz. of B

The image should appear in a few seconds, and development will be complete in about 1½ minutes. Rinse in three changes of water and fix.

quinone

Metol	200 grs	6 gms
Sodium sulphite	6 ozs	75 gms
Hydroquinone	150 grs	4 gms
Potass carbonate	2 ozs	25 gms
Potass bromide	50 grs	1 5 gm
Water	80 ozs	1000 c c s

Development will be complete in from 1 to 2 minutes

For softer prints, either of the above may be diluted with an equal bulk of water just before use

Barnet "Oyster-Shell" (Gaslight) Paper.

Metol	8 grs	1 75 gms
Hydroquinone	30 grs	7 0 gms
Sodium sulphite	350 grs	75 0 gms
Sodium carbonate	300 grs	70 0 gms
Potass bromide	3 grs	0 7 gm
Water	10 ozs	1000 c c s

The ingredients should be dissolved in the order named

For soft prints of cold black tone, use Rodinal, 1 part, water, 30 parts

Barnet Lantern Plates.

For Warm Black Tones

A	Hydroquinone	160 grs	18 gms
	Sodium sulphite	2 ozs	100 gms
	Potass bromide	30 grs	3 gms
	Citric acid	60 grs	7 gms
	Water	20 ozs	1000 c c s
B	Sodium hydrate	160 grs	18 gms
	Water	20 ozs	1000 c c s

Take equal parts of A and B

This produces a very pleasing warm black Length of time in developing, about 2 minutes

For Warm Brown Tones

A	Pyro	¼ oz	12 5 gms
	Soda sulphite	1 oz	50 gms
	Water	20 ozs	1000 c c s
B	Carbonate of ammonia	225 grs	26 gms
	Potassium hydrate	190 grs	21 gms
	Ammonium bromide	150 grs	17 gms
	Water	20 ozs	1000 c c s

Take equal parts of A and B Length of time in developing, about 2 minutes.

Or the following may be used :—

Take equal parts of hydroquinone formula and add to each ounce (100 c.c.s.) 3 grs. (0.6 gm.) each of carbonate of ammonia and ammonium bromide. Length of time in developing, about 3 or 4 minutes.

For Very Warm (Reddish) Tones.

Take equal parts of hydroquinone formula and add to each ounce (100 c.c.s.) 6 grs. (1.2 gm.) each of carbonate of ammonia and ammonium bromide. Length of time in developing about 8 minutes.

Barnet (Gaslight) Lantern Plates.

For Black and Warm Black Tones.

Hydroquinone	60 grs.	6.8 gms.
Sodium sulphite	1 oz.	50 gms.
Potass carbonate	2 ozs.	100 gms.
Potass bromide	20 grs.	2.3 gms.
Water	20 ozs.	1000 c.c.s.

This solution should develop in about two minutes.

For Cold Black Tones.

Rodinal	1¼ oz. (fl.)	62.5 c.c.s.
Potass bromide	15 grs.	1.7 gm.
Water	20 ozs.	1000 c.c.s.

For Warm Tones.

Eikonogen	30 grs.	3.4 gms.
Hydroquinone	10 grs.	1.2 gms.
Sodium sulphite	160 grs.	18.2 gms.
Potass carbonate	80 grs.	9.1 gms.
Potass bromide	15 grs.	1.7 gms.
Citric acid	20 grs.	2.3 gms.
Water	20 ozs.	1,000 c.c.s.

GEM DRY PLATE COMPANY, LTD.

"Gem" Plates.

Special for Studio Use.

A	Pyro	1 oz.	10 gms.
	Potass metabisulphite	½ oz.	5 gms.
	Potass bromide . .	20 grs.	0.4 gm.
	Water to	100 ozs.	1000 c.c.s.
B	Sodium carbonate	8 ozs.	80 gms.
	Sodium sulphite	16 ozs.	160 gms.
	Water to .	100 ozs.	1000 c.c.s.

To develop mix equal parts of A and B.

Potass metabisulphite	40 grs	4 gms
Metol	28 grs	0 8 gm
Hydroquinone	120 grs	12 gms
Sodium sulphite	2 ozs	96 gms
Sodium carbonate	3½ ozs	168 gms
Water	40 ozs	1800 c c

Add and dissolve in order named To each ounce (28 c c) of developer add 2 drops of a 10 per cent solution of potass bromide Dilute with an equal volume of water

"Gem" P.O.P.

A	Ammonium sulphocyanide	30 grs	2 gms
	Water	10 ozs	284 c c s
B	Gold chloride	2 grs	0 13 gm
	Water	10 ozs	284 c c s

Into a portion of A pour slowly an equal portion of B

Combined Bath

Sodium hyposulphite .	5 ozs	140 gms
Citric acid	12 grs	0 8 gm
Lead acetate	12 gr	0 8 gm
Alum	120 grs	8 0 gms
Hot water	16 ozs	500 c c

Stand twenty-four hours filter and add

Gold chloride	5 grs	0 3 gm
Dissolved in water .	1 oz	30 c c.

"Gem" Bromide and Gaslight Papers.

The metol hydroquinone developer given above for plates is recommended, as it stands, also for "Gem" gaslight paper for "Gem" bromide papers it is diluted with an equal quantity of water

"Gem" Lantern Plates.

Developer for Cold Tones

A	Hydroquinone	120 grs	8 gms
	Potass bromide	180 grs	12 gms
	Potass metabisulphite	120 grs	8 gms
	Water	30 ozs	900 c c s
B	Caustic potash (sticks)	240 grs	16 gms
	Water	30 ozs	900 c c s

Use equal parts of A and B
For chloride plates, dilute with water 4 to 8 times

For Warm Tones

C	Ammonium carbonate	1 oz	10 gms
	Ammonium bromide	1 oz	10 gms
	Water .	20 ozs	200 c c s

To obtain extra warm tones on "Gem" red lantern plates, give over-exposure and develop with one part of solution A and B and one part of C, increasing C as the exposure is lengthened

GEVAERT, LIMITED.

Gevaert P.O.P.

Toning Baths

Ammonium sulphocyanide .	45 grs	5 gms
Water, distilled	20 ozs	1000 c c s

Two hours before use, addition is made of —

Gold chloride solution (15 grs in 2 ozs) .	7 drs	40 c c.s

This formula yields fine purple blue tone

For carmine red tones, printing is done only slightly deeper than the finished print is required to be The prints are given three five-minute soaks in water and toned in —

Ammonium sulphocyanide	45 grs	5 gms
Potass iodide	10 grs	1 gm
Gold chloride solution (15 grs in 2 ozs) . .	2½ drs	15 c c s
Water	20 ozs	1000 c c s

Toning must be continued until the deepest shadows, on holding the prints up to the light and looking through them, show the carmine tone, this will take about half an hour. Until the toning has begun the prints should be kept constantly on the move, but they can then be left to themselves, except for the movement they get as each is picked out for examination at intervals The toning bath should be used only once, and it should be noted that the prints gain a little in drying Wash in one or two changes of water, and fix in the usual hypo bath of 2 ozs to 20 ozs of water

Gevaert Collodion Paper.

GOLD TONING SOLUTION

Sodium acetate, cryst .	90 grs	10 gms
Borax, powdered	90 grs	10 gms
Water	20 ozs	1000 c c s

This solution (without gold) keeps indefinitely, and can be made up in quantity The toning solution is made up as follows —

Stock solution	18 ozs	400 c c s
Gold chloride solution (15 grs in 2 ozs) ..	1 to 1¼ drs	3 to 3 5 c c s

This is mixed a quarter of an hour before use, and the quantity given (18 ozs) will tone about two dozen cabinets

PLATINUM TONING BATH

Potass chloroplatinite	15 grs	1 gm
Phosphoric acid sp gr 1 120	¼ oz	9 c c s
Water, distilled ..	42 ozs	1200 c c s.

This bath should be filtered each time before use.

Fixing Bath.

Hypo	1 oz	50 gms	Water..	20 ozs	1000 c.c.s

Prints should be fixed for at least ten minutes.

Sepia to Dark Brown Tones

(1) *With salt and platinum baths only no gold bath*

Printing is done rather more deeply than the finished print should appear. Prints are washed in two or three changes of water (about five minutes in each), and then transferred to a weak salt solution (a pinch of salt in 40 ozs. of water). Here they are left until they are seen to be brick-red. They are then given another couple of washes in water (each of five minutes) and transferred to the following platinum bath

Potass chloroplatinite	15 gr	1 gm
Phosphoric acid sp gr 1 120	½ oz	9 c c s
Water	42 ozs	1200 c c s

This bath is diluted with an equal or double volume of distilled water and the prints allowed to remain in it until they have reached the desired sepia or dark brown tone

(1) *With ammonia and platinum solutions only, no gold bath. A very easy and certain process*

Prints intended for a sepia tone by this method must be made lighter than for black tones. They are given a first washing in three changes of water as quickly as possible and then placed in a bath of weak ammonia

Ammonia	1 dr	5 c c s
Water	20 oz	1000 c c

In which they turn lemon yellow and appear much too light. They are given a thorough washing in six changes of water and then transferred to the platinum bath already given for black tones, but diluted with two or three times its bulk of water. They are allowed to remain until the desired tone is reached, and then washed, fixed, and finally washed as usual

Gevaert Bromide Paper.

Metol-Hydroquinone Developer

Metol . .	40 grs	6 gms
Hydroquinone	15 grs	2 gms
Soda sulphite, cryst	1 oz	60 gms
Potash carbonate .	140 grs	20 gms
Potass bromide	70 grs.	10 gms
Water to . .	20 ozs.	1200 c c s

Dissolve the metol first in the water, and then add the other chemicals in the order given. This developer will keep good for a long time if kept well corked

Glycin Developer

Stock Mixture

Soda, sulphite, cryst.	4 ozs.	62 gms
Glycin	2½ ozs.	25 gms
Potass carbonate	1 oz	125 gms
Water hot, distilled	5 ozs	100 c.c.s

The chemicals are dissolved in the order given, adding the potass carbonate in small portions in order that the mixture shall not froth over. For safety a 20-oz. measure should be used. The result is a creamy mixture which must be vigorously shaken before use. It keeps almost indefinitely.

For use, take

Stock solution	½ oz.	15 c.c.s
Water	7 oz.	200 c.c.
Potass bromide 10 per cent solution	2 drops	2 drops

The print should develop up in two or three minutes, and is then well rinsed and fixed.

Gevaert Gaslight Paper.

Metol Hydroquinone Developer

Metol	12 grs	1.5 gm
Soda sulphite	1½ ozs	75 gm
Hydroquinone	50 gr	6 gms
Soda carbonate (cryst.)	1 oz	40 gms
Potass bromide (10 per cent solution)	20-40 drops	30-60 drops
Water	20 ozs	1000 c.c.s

The above constituents should be dissolved in the order named. The solution keeps for a long while in well stoppered bottles.

Glycin Developer

For Warm Tones.

The time of exposure may be prolonged or curtailed in order to obtain a range of colours, and the same developing formula used for all.

Glycin developer stock mixture.

Soda sulphite	2½ ozs	62 gms
Glycin	1 oz	25 gm
Potass carbonate	5 ozs	125 gms
Water, distilled, and hot	4 ozs	100 c.c.s

Dissolve the chemicals in the above order, adding the potass carbonate last, and in small quantities as the mixture froths up. A 20-oz. measure should be used for the above quantities. The result is a mixture of creamy appearance and consistency which must be vigorously shaken before use.

Developer

Stock solution	½ oz	10 c.c.s
Water	15 ozs	200 c.c.s
Potass bromide (10 per cent solution)	7 drops	5 drops

JOHN J. GRIFFIN & SONS, LTD.

Griffin P.O.P.

CARBONS

Toning

Gold chloride	2 grs	0 23 gm
Ammonium sulphocyanide	20 grs	2 3 gms.
Water	20 ozs	1000 c c s

COMBINED BATH

Distilled water	35 ozs	2000 c c s
Hypo	44 ozs	250 gms
Alum	½ oz	43 gms
Ammonium sulphocyanide	150 grs	20 gms
Sodium chloride	14 oz	86 gms

After a short time the liquid gets thick It must then be left for eight days, and the clear liquid finally poured off Then add to the clear solution

Gold chloride	15 grs	1 gm
Water	3½ ozs	100 c c s

PLATINUM TONING BATH

1% potass chloroplatinite solution	5¼ drs	20 c c s
Citric acid	80 grs	5 gms
Water up to	10 ozs	280 c c

"SPECIAL P O P"

Separate Toning and Fixing

Wash prints for 10 minutes, then place in

Gold chloride	1 gr	0 23 gm
Ammonium sulphocyanide	10 grs	2 3 gms
Water	10 ozs	1000 c c s

"PROFESSIONAL" P O P

Toning Bath

Gold chloride	1½ gr	0 1 gm
Ammonium sulphocyanide	15 grs	1 gm
Water .	25 ozs	700 c c

Goldona (Self-Toning) Paper.

The prints are plunged straight into the fixing bath

For warm tones, fix in 1 5 hypo for 15 minutes

For colder tones, fix in 2 5 hypo for 10 to 15 minutes.

"Snow-White" Bromide Paper.

To develop the image, first plunge the paper in clean water, place at the bottom of a clean porcelain dish, and apply evenly the following or any standard developer :—

Amidol	70 grs.	8 gms.
Sodium sulphite	650 grs.	74 gms.
Potassium bromide	4 grs.	0.45 gm.
Water	20 ozs.	1000 c.c.s.

"Noctona" (Gaslight) Paper.

Developer.

Water	20 ozs.	1000 c.c.s.
Metol	15 grs.	1.7 gms.
Hydroquinone	60 grs.	6.8 gms.
Soda sulphite	440 grs.	50 gms.
Soda carbonate	600 grs.	68 gms.
Potass. bromide	7 grs.	0.8 gm.

Dissolve in the order given. Normal time of development about 30 seconds.

"Gaslyt" Lantern Plates.

Developer for Black Tones.

Water	8 ozs.	1000 c.c.s.
Metol	4 grs.	1.2 gm.
Sodium sulphite	75 grs.	20 gms.
Hydroquinone	16 grs.	4.6 gms.
Sodium carbonate	280 grs.	80 gms.
Potassium bromide	8 grs.	2.3 gms.

For Warm or Sepia Tones.

Solution (as for black tones)	1 oz.
Water	2 ozs.
Potassium bromide solution (10 per cent.)	10 drops.

Rawlins's Oil-Pigment Paper.

Sensitizer.

Potassium bichromate	1 oz.	50 gms.
Water	20 ozs.	1000 c.c.s.

Use for about one minute.

HALIFAX PHOTOGRAPHIC CO.

"Halifax" Plates.

SWIFTS

A	Pyro	½ oz	16 gms
	Potass metabisulphite	½ oz	16 gms
	Potass bromide	10 grs	0.76 gm
	Water	30 ozs	1000 c.c.
B	Sodium carbonate	3 ozs	100 gms
	Sodium sulphite	4 ozs	133 gms
	Water	30 ozs	1000 c.c.

Use equal parts of A and B, or increase B for soft

TRADE

A	Pyro	¼ oz	12.5 gms
	Potass metabisulphite	30 grs	3.4 gms
	Water	20 ozs	1000 c.c.
B	Soda carbonate (cryst.)	2 ozs	100 gms
	Soda sulphite (cryst.)	2 ozs	100 gms
	Potass bromide	10 grs	1.14 gms
	Water	20 ozs	1000 c.c.s

Use equal parts of A and B

PROCESS

A	Pyro	1 oz	20 gms
	Potass metabisulphite	½ oz	10 gms
	Potass bromide	20 grs	0.91 gm
	Water to make	50 ozs	1000 c.c.s
B	Sodium carbonate	6 ozs	120 gms
	Sodium sulphite	8 ozs	160 gms
	Water to make	50 ozs	1000 c.c.s

Use equal parts of A and B

"Lilywhite" P.O.P.

Combined Bath

Water (pure or distilled) hot	20 ozs	1000 c.c.s
Hypo	5 ozs	250 gms
Ammonium sulphocyanide	240 grs	27.4 gms
Citric acid	60 grs	6.84 gms
Lead acetate	60 grs	6.84 gms
Alum	60 grs	6.84 gms
Gold chloride (in solution)	3 grs	0.34 gm

Dissolve in the order named and use when cold. Use 1 grain of gold for 8 to 10 cabinets.

The separate toning baths (sulphocyanide, borax, and acetate) are also recommended for "Lilywhite" P.O.P.

"Lilywhite" C.C. Paper

GOLD PLATINUM TONING.

The well-washed prints are first toned in

Sodium acetate	62 grs.	4 gms.
Borax	62 grs.	4 gms.
Gold chloride, 1 per cent. solution	2½ drs.	9 c.c.s.
Water	14 ozs.	400 c.c.s.

After an intermediate wash of about 3 minutes, tone in—

Potass. chloroplatinite	15 grs.	1 gm.
Phosphoric acid (sp. gr. 1.12)	2½ drs.	9 c.c.s.
Water	40 ozs.	1140 c.c.

"Lilywhite" Self-toning P.O.P.

Fixing bath for brown to purple tones:—

Hypo	4 ozs.	200 gm.
Water	20 ozs.	1000 c.c.

For warmer tones this is used half strength.

For colder tones five minutes' immersion in 10 per cent. salt bath is given prior to fixing.

"Lilywhite" Bromide Paper.

Metol	50 grs.	5.7 gms.
Hydroquinone	15 grs.	1.7 gm.
Soda sulphite	500 grs.	57 gms.
Potass. bromide	10 grs.	1.1 gm.
Potass. carbonate	100 grs.	11.4 gm.
Water	20 ozs.	1000 c.c.

"Lilywhite" Gaslight Paper.

Developer.

Water (boiled or distilled) cold	20 ozs.	1000 c.c.
Metol	15 grs.	1.71 gm.
Sodium sulphite (cryst.)	540 grs.	61.6 gms.
Hydroquinone	60 grs.	6.84 gms.
Sodium carbonate	1080 grs.	123.1 gm.
Potass. bromide	3 grs.	0.34 gm.

Dissolve in order named and keep well corked. A few drops of 10 per cent. solution potass. bromide should be added if increased contrast is desired. If softer results are wanted, increase the exposure and dilute the developer with equal bulk of water.

ILFORD, LTD.

Ilford Plates.

("Ordinary," "Zenith," "Monarch," "Chromatic," etc.)

PYRO-SODA DEVELOPER.

Stock Solutions.

A	Water	5¼ ozs.	150 c.c.s
	Nitric acid	20 drops	20 drops (1 c.c.)
	Pyrogallic acid	1 oz.	28 gms.

This solution will keep good for several weeks.

Or—

B	Water	5¼ ozs.	150 c.c.s
	Potass. metabisulphite	70 grs.	5 gms.
	Pyrogallic acid	1 oz.	28 gms.

This solution will keep good for several months.

Working Solutions.

No. 1	Stock solution of pyro, A or B	1 to 2 ozs.	25 to 50 c.c.s
	Water to make up to	20 ozs.	500 c.c.s
No. 2	Sodium carbonate, crystals (not bicarbonate) avoirdupois)	2 ozs.	100 gms.
	Sodium sulphite (avoirdupois)	2 ozs.	100 gms.
	Potassium bromide	20 grs.	2 gms.
	Water to make up to	20 ozs.	1000 c.c.s

For normal exposure take equal quantities of Nos. 1 and 2.

METOL-HYDROQUINONE.

A	Metol	60 grs.	3.5 gms.
	Hydroquinone	90 grs.	5 gms.
	Potass. metabisulphite	90 grs.	5 gms.
	Water up to	20 ozs.	500 c.c.s
B	Sodium carbonate (crystals)	2 ozs.	50 gms.
	Sodium sulphite (crystals)	2 ozs.	50 gms.
	Potass. bromide	20 grs.	1 gm.
	Water up to .	20 ozs.	500 c.c.s

METOL-PYRO DEVELOPER.

This developer is fully as energetic as metol-hydroquinone. In dealing with unknown exposures it is best to start with equal parts of A and C, and add B and more of C if necessary afterwards.

A	Stock solution of pyro	2 ozs.	50 c.c.s
	Water up to	20 ozs.	500 c.c.s
B	Metol	90 grs.	5 gms.
	Potass. metabisulphite	20 grs.	1 gm.
	Potass. bromide .	45 grs.	2.5 gms.
	Water up to	20 ozs.	500 c.c.s

C	Sodium carbonate (crystals) (not bicarbonate)	2 ozs	50 gms
	Sodium sulphite (crystals)	2 ozs	50 gms.
	Potass bromide	20 grs	1 1 gm
	Water up to	20 ozs	500 c c s

Normal Developer —A, 1 part, B, 1 part, C, 2 parts

Ilford "Process" Plates.

Development of Line Negatives

A.	Metol	30 grs	2 3 gms
	Hydroquinone	150 grs	11 4 gms
	Sodium sulphite	3½ ozs	108 gms
	Water	30 ozs	1000 c c s
B	Potass carbonate	6 ozs	200 gms
	Potass bromide	90 grs	6 8 gms
	Water	30 ozs	1000 c c s

Use equal parts of A and B, develop for about one minute, then immerse in a weak solution of sodium citrate (or add a little to the developer), and complete development Great density is thus obtained

The negatives should be fixed in an acid-alum-hypo bath, and can then be dried quickly in moderate warmth

Development of Screen Negatives

A	Metol	40 grs.	4 6 gms
	Hydroquinone	50 grs	5 7 gms
	Potass bromide	30 grs	3 4 gms
	Soda sulphite	80 grs	9 1 gms
	Water	20 ozs	1000 c c s
B	Caustic potash	100 grs	11 4 gms
	Water	20 ozs	1000 c c s

Use equal quantities of A and B, fix in hypo (8 ozs to the pint), "cut with Farmer's reducer, clear with

Sulphuric acid	2 drs	35 c c s
Water	10 ozs	1000 c c .

and intensify by Monckhoven method

Dye Bath for Three-Colour Work

Stock Solution A

Pinaverdol .	1 gm
Warm absolute alcohol	1000 c c s

The bathing solution is composed of

Solution A	4 parts
Ammonia, 0 880 pure .	2 parts
Distilled water ..	200 parts

in which plates are immersed for three minutes

Ilford P.O.P.

Hardening Bath.

Alum . . .	1½ oz	45 gms
Common salt .	1 oz	30 gms
Water .	20 ozs	600 c c s

in which prints are kept moving for 5 or 10 minutes

Toning Bath

No 1	Ammonium sulphocyanide	100 grs	6 5 gms
	Water	10 ozs	300 c c s.
No 2	Sodium sulphite	10 grs	0 65 gm
	Water .	10 ozs	300 c c s

This solution must be made up on on the day of using, any left must be thrown away

No 3	Gold chloride	15 grs	1 gm
	Water .. .	15 ozs	450 c c s

For the usual toning bath, take 2 ozs each of Nos 1 and 3, and make up to 20 ozs with water

For *warm* tones and Special P O P add 1½ to 2 ozs of No 2 to the above bath just before toning, and withdraw prints according to tone desired

Kalona (Self-Toning) Paper.

The prints, without previous washing, are slipped rapidly one by one face upwards into the following solution

Alum (powdered)	1½ ozs	30 gms
Ammonium sulphocyanide	20 grs	1 gm
Water	20 ozs	400 c c s

where they must be constantly turned over for five minutes The prints should next be washed for ten minutes in running water or repeated changes, and fixed for ten minutes in a solution of—

Hypo	3 ozs	75 gms
Water	20 ozs	500 c c s

They are then finally washed for two hours in the same way as Ilford P O P

In tropical climates the following may be used instead of the ordinary formula —

Ammonium sulphocyanide	20 grs	2 3 gms
Chrome alum	20 grs	2 3 gms
Water . . .	20 ozs	1000 c c s

The colour of the prints is not affected

The alum and sulphocyanide solution *may* be omitted and the prints put into a solution of—

Common salt	1 oz	50 gms
Water	20 ozs	1000 c c s

for five minutes and then fixed, but the resulting tone is warmer than that obtained by the use of the sulphocyanide It is, however, permanent Prints treated in this way are not so suitable for enamelling.

Ilford Bromide Paper and Opals.

Metol-Hydroquinone Developer

No 1	Metol	50 grs	4 gms
	Hydroquinone	25 grs.	2 gms
	Sodium sulphite	1 oz	35 gms
	Water up to	20 ozs	700 c c s
No 2	Sodium carbonate (crystals)	1 oz.	35 gms
	Potass bromide	30 grs	2 4 gms
	Water up to	20 ozs	700 c c s

Take equal quantities of No 1 and No 2

Certinal Developer

Certinal	16 minims	1 part
Water	1 oz	30 part

Ilford Gaslight Papers.

Developer

Metol	5 grs	0 3 gm
Sodium sulphite	½ oz	15 gms
Hydroquinone	20 grs	1 3 gm
Sodium carbonate (crystals)	½ oz	15 gms
10 per cent solution of potass bromide	10 minims	0 6 c c s
Water	10 ozs	300 c c s

This developer, as also the following Certinal developer, is also used for the "Ilford Gaslight Lantern Plates

Certinal	32 minims	1 part
Water	1 oz	15 parts

Ilford "Platona" (Platinum) Paper.

Developing Formula —Stock Solution

Potass oxalate	2 ozs	72 gms
Potass phosphate	½ oz	18 gms
Water	14 ozs	500 c c s

This solution is better if slightly acid, if it is not so, 60 grs (4 gms) oxalic acid should be added. If potassium phosphate is unobtainable, the sodium phosphate may be substituted, but the former is preferable Dissolve the salts in hot water, and allow to cool This solution will keep indefinitely

For use, take 1 part stock solution and 1 part water

Fixing

Hydrochloric acid (pure)	1 oz	20 c c s
Water	80 ozs.	1600 c c s

Immerse prints for about five minutes each in three consecutive baths, and then give them a final washing in water for fifteen minutes.

Ilford Lantern Plates.

"SPECIAL" FOR BLACK TONES

Metol-Hydroquinone Developer

1	Metol	50 grs	5.6 gms
	Hydroquinone	25 grs	2.8 gms
	Sodium sulphite	1 oz	50 gms
	Water up to	20 ozs	1000 c.c.
2	Sodium carbonate	1 oz	50 gms
	Potass bromide	30 grs	3.4 gms
	Water up to	20 ozs	1000 c.c.

Equal parts of Nos 1 and 2

Hydroquinone Developer

1	Hydroquinone	160 grs	18.2 gms
	Sodium sulphite	2 ozs	100 gms
	Water up to	20 ozs	1000 c.c.s
2	Sodium hydrate	80 grs	9.1 gms
	Sodium sulphite	30 grs	3.4 gms
	Water up to	20 ozs	1000 c.c.s

No 1, 1 part; No 2, 1 part, water, 2 parts

Certinal Developer

Certinal	16 minims	1 part
Water	1 oz	30 parts

"ALPHA" PLATES—FOR WARM TONES

The only suitable developer is

A	Hydroquinone	80 grs	9.1 gms
	Sodium sulphite	1 oz	50 gms
	Water to	20 ozs	1000 c.c.s
B	Sodium hydrate	30 grs	3.4 gms
	Potass bromide	15 grs.	1.7 gms.
	Water	20 ozs	1000 c.c.s

A, 1 oz, B 1 oz

The hydroquinone solution should not be used after it has become yellow, as it loses its developing power

GASLIGHT

For developers see under Ilford Gaslight Papers above

TONING AND FIXING BATH

The plates must be thoroughly washed after development and are fixed and toned in one operation by means of a combined bath The formula is --

Hypo	2½ ozs	250 gms
Ammonium sulphocyanide	¼ oz	25 gms
Gold chloride	4 grs	0.9 gm
Water	10 ozs	1000 c.c.

The three salts should be dissolved in water and the gold chloride added last of all A convenient plan is to dissolve the hypo and sulphocyanide in 6 oz of water and then add 4 oz of the stock solution

of gold chloride (15 grains in 15 oz.) used to make up the toning bath for P.O.P. The bath should be made up a day or two before it is used.

When placed in this bath the plates fix rapidly and the image has a red or red brown colour if the exposure has been sufficient, but this colour gradually changes to brown, photographic purple, purple black, black, and finally blue, as the action of the bath is allowed to continue. The plate should be removed and well rinsed with water when its colour is somewhat warmer than that desired in the finished slide.

Of course if a red toned slide is desired the plates should be simply fixed in plain hypo and if necessary modified by a short immersion in the toning bath. From 35 to 60 minutes toning is required in order to obtain a blue colour; photographic purple is obtained in about 15 minutes and purple black in about twenty-five.

THOS. ILLINGWORTH & CO., Ltd.

"Zigo" Self-Toning Papers.

For brown or purple tones place prints direct in

Hypo	4 oz. (4 tablespoonful.)	200 gm.
Water	20 oz. (1 pint)	1000 c.c.

For red tones use half the above strength.

For sepia tones, immerse print direct in 10 % salt solution for five minutes, and then, without washing, transfer to hypo bath.

Illingworth Bromide Paper.

AMIDOL DEVELOPER.

Amidol	50 grs.	5.7 gms.
Sodium sulphite	600 grs.	70 gms.
Potass. bromide	10 grs.	1.2 gm.
Water	20 oz.	1000 c.c.s.

To be used within three days of mixing.

"Zigas" Gaslight Paper.

DEVELOPER.

Metol	7 grs.	1.6 gm.
Hydroquinone	30 grs.	6.8 gms.
Sodium sulphite	220 grs.	50 gms.
Sodium carbonate	400 grs.	91 gms.
10 % bromide of potassium	30 to 40 drops	100 to 120 drops
Water	10 ozs.	1000 c.c.s.

The prints are fixed in an acid bath.

IMPERIAL DRY PLATE CO., LTD.

Imperial Plates.

("*Special Rapid*," "*Flashlight*," "*Orthochrom* *and* '*N F*

"STANDARD" DEVELOPER

No 1	Metol	45 grs	5 gms
	Potass metabisulphite	120 grs	14 gms
	Pyrogallic acid ..	55 grs	6 gms
	Potass bromide	20 grs	2 gms
	Water (boiled or distilled) to	20 ozs	1000 c c s
No	Sodium carbonate (washing soda) ..	4 ozs	200 gms
	Water (boiled or distilled) to	20 ozs	1000 c c s

For use, take equal parts of No 1 and No

"UNIVERSAL" DEVELOPER

No 1	Metol	40 grs	5 gms
	Sodium sulphite	120 grs	14 gms
	Hydroquinone	50 grs	6 gms
	Potass bromide	15 grs	2 gms
	Water (boiled or distilled) to	20 ozs	1000 c c s
No 2	Caustic potash	180 grs	21 gms
	Water (boiled or distilled) to	20 ozs	1000 c c s

For use, take equal parts of No 1 and No 2

In making up No 1 solution dissolve the metol 12 ozs of water at 95°, and the sulphite in 4 ozs at 95°, when both are completely dissolved mix and add the hydroquinone, and then the bromide, and make up to 20 ozs For No 2 begin with 16 ozs of water at 95

PYRO SODA DEVELOPER

Stock Solution

	Potass metabisulphite	50 grs	10 gms
	Pyrogallic acid	1 oz	53 gms
	Potass bromide	60 grs	13 gms
	Water (boiled or distilled) to	12 ozs	1000 c c s
No 1.	Stock solution	3 ozs	150 c c s
	Water (boiled or distilled)	20 ozs	1000 c c s
No 2	Sodium sulphite	2 ozs	100 gms
	Sodium carbonate (washing soda)	2 ozs	100 gms
	Water (boiled or distilled) to	20 ozs	1000 c c s

For use, take equal parts of No. 1 and No 2

HYDROQUINONE DEVELOPER

No 1	Potass metabisulphite .	10 grs	1 gm
	Hydroquinone ..	150 grs	16 gms
	Potass bromide .	50 grs	6 gms.
	Water (boiled or distilled) to	20 ozs	1000 c c s

No 2	Sodium sulphite	2 ozs	100 gms
	Caustic soda	100 grs	11 gms
	Water (boiled or distilled) to ..	20 ozs	1000 c c s

For use, take equal parts of No 1 and No 2

After using this developer, always rinse the negative well before transferring to the fixing bath

SINGLE SOLUTION DEVELOPER.

Metol	50 grs	5 5 gms
Hydroquinone	40 grs	4 5 gms
Sodium sulphite	500 grs	57 gms
Potass bromide	25 grs	3 gms
Sodium carbonate	500 grs	57 gms
Water (boiled or distilled) to	20 ozs	1000 c c

Imperial P O.P

SULPHOCYANIDE TONING BATH

Stock Gold Solution

	Chloride of gold	15 grs	18 gms
	Water (distilled or boiled) to	15 drs	1000 c c s
No 1	Ammonium sulphocyanide	60 grs	6 8 gms
	Water (boiled or distilled) to	20 ozs	1000 c c s
No 2	Stock gold solution	5 drs	31 c c s
	Water to	20 ozs	1000 c c s

For use, take equal quantities of No 1 and No 2

Add solution No 2 slowly to solution No 1, stirring all the time

Imperial Self-Toning P.O.P.

Print exactly as P O P and without any washing, immerse prints in—

Ammonium sulphocyanide	20 grs	2 3 gms
Powdered alum	1½ oz	75 gms
Water	20 ozs	1000 c c s

The temperature of this bath should not be more than about 60

"Imperial" Bromide and Gaslight Papers.

A	Metol	50 grs	5 7 gms
	Hydroquinone	40 grs	4 6 gms
	Sodium sulphite	500 grs	57 gms
	Water to make	20 ozs	1000 c c s
B	Potass bromide	25 grs	2 8 gms
	Sodium carbonate	500 grs	57 gms
	Water to make	20 ozs	1000 c c s

Equal quantities of A and B

Imperial "Special" Lantern Plates are developed with the hydroquinone formula given above for negative plates

Imperial "Gaslight" Plates are developed in a single solution made by dissolving all the chemicals of the bromide paper developer given above in 20 ozs (or 1000 c c s) of water

KENTMERE, LTD.

"Kentmere" P.O.P.

Phosphate Toning Bath

Gold chloride	2 grs.	0.11 gm
Soda phosphate	60 grs	3.42 gms
Water	20 ozs	500 c.c.s

or enough to cover prints

This bath is recommended for toning cards or prints in quantities, 2 grains of gold toning about 100 post cards. The more water added the slower the toning. Use enough water to allow of cards being moved easily and quickly.

"Kentmere" Self-Toning P.O.P.

Place into one of the following fixing baths with or without previous washing. Do not let the same bath be too cold.

For Red Brown Tones		*For Purple Tones*	
Hypo	4 ozs	Hypo	6 ozs.
Water	1 pint	Water	1 pint

Remove from bath immediately desired tone is reached, which should not be less than five minutes or more than eight.

"Kentmere" Bromide and Gaslight Papers.

Developers

	Bromide		Gaslight	
Metol	10 grs	1.14 gm	14 grs	1.60 gm
Hydroquinone	30 grs	3.42 gms	60 grs	6.84 gm
Water to	20 ozs	1000 c.c.s	20 ozs	1000 c.c.s
Dissolve and add—				
Soda sulphite	¾ oz	37.5 gms	1 oz	50 gms
Soda carbonate	¾ oz	37.5 gms	1 oz	50 gms
Potass bromide	10 grs	1.14 gm	6 grs	0.68 gm

KODAK, LTD

Kodak Film.

PYRO DEVELOPER

Also for Film pack and Kodoids

A	Pyrogallic acid	1 oz	30 gms
	Sulphuric acid	20 minims	1 c.c.
	Water	28 ozs	900 c.c.s
B	Sodium sulphite	6 ozs	180 gms
	Sodium carbonate crystal	6 ozs	120 gms
	Water	28 ozs	900 c.c.s

A, 1 oz., B, 1 oz., water, 8 ozs.

For Kodak developing machine, Brownie developing box (6 minute development) or Kodak film tank (10 minute development) take A, 1 oz., B, 1 oz, water, 10 ozs

Kodoid Plates and Premo Film Pack

A	Metol	60 grs	7 gms
	Hydroquinone	30 grs	3 5 gms
	Sodium sulphite	1¼ ozs	75 gms
	Water	20 ozs	1000 c c s
B	Sodium carbonate	1 oz	50 gms
	Water	20 ozs	1000 c c s

A, 1 oz, B, 1 oz, water, 2 ozs

Add 1 or 2 drops 10 per cent solution potassium bromide to each oz of developer

Eastman Plates

Developer

A	Water	32 ozs	1000 c c s
	Potassium metabisulphite	60 grs	4 gms
	Potass bromide	60 grs	4 gms
	Pyro	1 oz	30 gms
B	Water	32 ozs	1000 c c s
	Sodium sulphite	8 ozs	250 gms
C	Water	32 ozs	1000 c c s
	Sodium carbonate	8 ozs	250 gms

A, 2 parts, B, 2 parts, C, 2 parts, water, 3 parts

Seed Plates

Developer

A	Pyro	1 oz	60 gms
	Soda sulphite crystal	4 ozs	240 gms
	Sulphuric acid	5 drops	none
	Water	16 ozs	1000 c c s
B	Soda carbonate crystal	4 ozs	240 gms
	Water	16 ozs	1000 c c s

For use, A, 1 oz B, 1 oz water, 8 ozs

Kodak Solio P O.P.

Toning Bath Stock Solution

Gold chloride	15 grs (1 tube)	1 gm
Ammonium sulphocyanide	150 grs	10 gms
Water to	30 ozs.	1000 c c s

The sulphocyanide should be dissolved first and the gold added afterwards Each ounce contains ½ gr of chloride of gold

To impart to a 1s packet of paper a cold purple-black tone take 6 ozs of the stock solution and dilute with water to measure, say, 30 ozs Treat all the prints at the same time, and allow them to

remain in the bath for eight minutes, keeping them in motion as usual in toning

For a purple-brown colour a packet of paper requires 3 ozs of stock solution, or for a brown colour 1½ oz of stock solution, whilst 1 oz of stock solution will give a red tone

The amount of water to be added to the stock solution is in all cases just as much as is considered necessary for conveniently handling the prints

Wash the batch of the prints well for 10 minutes in running water (or in three changes of water) Transfer as rapidly as possible the whole of them, one by one, to the toning bath

Tone for 8 or 10 minutes, moving the prints all the time, and rinse well before fixing

COMBINED TONING AND FIXING BATH

A	Hypo	6 ozs	200 gms
	Ammonium sulphocyanide	18 grs	4 gms
	Water	32 ozs	1000 c c s
B	Gold chloride	15 grs (1 tube)	1 gm
	Lead acetate	150 grs	10 gms
	Water	16 ozs	500 c c s

Take 7 parts of A to 1 part of B Print decidedly darker than for ordinary bath Wash thoroughly and tone in this bath

Platinum Toning for Matt "Solio"

Potassium chloroplatinite	5 grs	1 gm
Citric acid	40 grs	8 gms
Sodium chloride (salt)	40 grs	8 gms
Water	20 ozs	1000 c c s

This bath keeps well for a month

Wash the prints from 5 to 10 minutes, and then immerse in the above bath, examining the prints by transmitted light

Tone to a dark brown or chocolate colour (not black), rinse lightly, and immerse the prints in the following bath to stop the toning action

Sodium carbonate (washing soda)	¼ oz	15 gms
Water	20 ozs	600 c c s

Rinse and transfer to the following fixing bath

Sodium hyposulphite	3 ozs	150 gms
Water	20 ozs	1000 c c s

Wash thoroughly in running water or in frequent changes for one hour

DEVELOPING "SOLIO"

Develop with the following developer until the prints look similar to printed-out prints, but rather more brown in colour, this should take 5 or 6 minutes

Hydroquinone	26 grs	2 gms
Citric acid	60 grs	5 gms
Sodium acetate	1¼ oz	50 gms
Water	30 ozs	1000 c c s

Wash for about 15 minutes The prints will continue to develop very slightly, and for this reason care should be taken not to develop them too dark Then tone in the sulphocyanide or combined toning and fixing bath in the usual way

KODAK "SOLIO" No 2

The sulphocyanide bath for cold tones is that already given for ordinary "Solio"

For warm tones the following stock solution is prepared -

Gold chloride	15 grs	1 gm
Water	30 ozs	1000 c c s

Take 1 part of the stock solution to 10 parts of water Neutralise exactly with a saturated solution of borax, add one drop at a time, stir and test with litmus paper, repeating this operation until the bath does not alter the colour of blue or red litmus paper This borax toning bath is ready for use at once, but will not keep

PLATINUM TONING FOR MATT SOLIO No 2

To obtain rich sepia tones make up the following stock solutions —

Potassium chloroplatinite	15 grs	1 gm
Citric acid	2 drs	8 gms
Sodium chloride (common salt)	2 drs	8 gms
Water	30 ozs	1000 c c s

For use, take 1 part of the stock solution and add 20 parts of water Tone until the high-lights are clear, which takes about 5 minutes, and then immerse the prints in the following bath to stop further toning -

Sodium carbonate (washing soda crystals)	½ oz	15 gms
Water	20 ozs	600 c c s

Again rinse and fix, etc , as already described

Kodak Collodio-Chloride Papers

Matt

When the prints are sufficiently washed and ready to tone, they are first placed in a plain gold bath, made alkaline with borax, enough to turn red litmus paper blue in one minute

Gold chloride	2½ grs	0 16 gm
Water	60 ozs	1700 c c s

Add sufficient of a saturated solution of borax to make bath very slightly alkaline (about 25 to 30 drops) The bath should be made up one to two hours before use

Tone in this bath to chocolate brown in the deepest shadows by transmitted light Add gold enough to keep the speed of the bath 6 to 8 minutes If the prints show bleaching in the half-tones before the shadows are toned far enough, add more borax The alkali acts as a restrainer on the half-tones The amount to use is the amount necessary to hold the half tones from bleaching while the shadows tone When the prints are toned, place in clear water , and when all

are toned, wash in three changes of water and tone in platinum bath

KODAK GLOSSY C C PAPER

Print considerably darker than desired when finished and after washing tone in the following bath —Water 60 ozs, kodak gold solution 2 drachms (or, if dry chloride of gold is used, 2 grains), and ½ drachm of dry acetate of soda Add a few drops of saturated solution of borax, enough to make the bath slightly alkaline Allow to stand 2 or 3 hours before using

For Dark Tones

Water		900 c c s
Ammonium sulphocyanide	½ oz	14 gms
Gold chloride	2 grs	0 13 gm

ARISTO PLATINO C C PAPER

Gold Toning Baths

Salt	30 grs	0 68 gm
Gold chloride	4 grs	0 1 gm
Water	100 ozs	1000 c c s

Add saturated borax solution enough to turn red litmus paper blue in half a minute

ARISTO JUNIOR

Salt	20 grs	0 9 gm
Sodium acetate (saturated solution)	½ oz	8 c c s
Gold chloride	2 grs	0 07 gm
Water	60 oz	1000 c c s

Add saturated solution of soda carbonate or borax, enough to turn red litmus paper blue in 1 to minutes Bath is made up 4 to 5 hours before use and should tone in 6 to 8 minutes

For dark tones on "Aristo Junior," the following bath is used

Ammonium sulphocyanide	½ oz	14 gms
Gold chloride	2 grs	0 13 gm
Water		900 c c s

Kodak Self-Toning Papers

"SOLIO" (GELATINE) P O P

Put the prints, without previous washing, into the following bath, and keep them moving for 3 to 5 minutes

Ammonium sulphocyanide	20 grs	2 gms
Water	20 ozs	1000 c c s

Wash for 5 minutes in running water, or several changes, and fix in—

Hypo	3 ozs	150 gms
Water	20 ozs	1000 c c s

for 10 minutes Then wash in running water for one hour, or in 15 to 16 changes

The following alternative baths will give good warm tones on both grades of paper, but are specially recommended for matt. Put the prints, without previous washing, into the following bath:—

Salt	1 oz.	50 gms.
Water	20 ozs.	1000 c.c.s.

for 5 minutes, and then place in the above fixing bath.

COLLODION, GLOSSY AND MATT.

For cold, purple brown tones, immerse without previous washing directly into hypo, 2½ ozs.; water, 20 ozs., for 10 minutes.

For warm brown tones, wash in three changes of cold water, and transfer for 10 minutes to fixing bath.

For rich purple black tones, put the print directly into salt, 60 grs.; water, 20 ozs., for three minutes, and then transfer to the fixing bath for 10 minutes.

"VELOX" COLLODION.

For Warm Tones.

Wash in two changes and fix for 15 minutes in 1: 8 hypo, made slightly alkaline with ammonia; transfer for 10 minutes to 1: 20 salt bath and wash.

For Cold Tones.

Treat for 5 minutes in 1: 60 salt bath, take out into clean water, fix for 15 minutes in 1: 8 hypo bath and transfer (for 10 minutes) to 1: 20 salt bath, finally washing as usual.

Kodak Bromide Papers.

"Permanent," "Platino-Matt," "Royal," "Whit Royal," "Nikko," and "Velvet."

Metol Hydroquinone Developer.

Metol	8 grs.	0.9 gm.
Hydroquinone	30 grs.	3.5 gms.
Sodium sulphite	¾ oz.	38 gms.
Sodium carbonate	¾ oz.	38 gms.
10% solution potassium bromide	20 minims	1 c.c.
Water	20 ozs.	1000 c.c.s.

Amidol Developer.

Amidol	60 grs.	1.8 gm.
Sodium sulphite	1 oz.	50 gms.
10% solution potassium bromide	20 drops	1.5 c.c.s.
Water	20 ozs.	1000 c.c.s.

HYPO-ALUM SEPIA TONING.

Hypo	10 ozs.	280 gms.
Alum	1 oz.	28 gms.
Boiling water	70 ozs.	2000 c.c.s.

Dissolve the hypo in the water, and then add the alum slowly. When all is dissolved the solution should be milk white. This solution should not be filtered, and it works better as it becomes older; it

may be strengthened from time to time with a little fresh solution Never throw the bath away entirely, but replenish it in the manner stated The best results are obtained on prints developed by the above amidol formula, and by keeping the bath hot, or as warm as the emulsion will stand, say 100 to 120 degrees F In this bath prints will tone in 30 to 40 minutes

When toned, the prints should be placed in a tepid solution of—

Water	70 ozs	2000 c c s
Alum	2 ozs	60 gms

then washed thoroughly

Kodak Gaslight Papers.

"Dekko"

Developer

Hydroquinone	30 grs	3 5 gms
Metol	7 grs	0 8 gm
Sodium sulphite	220 grs	25 gms
Sodium carbonate	400 grs	45 gms
Potassium bromide (10 %)	10 drops	16 drops
Water up to	20 ozs	1000 c c s

A fixing bath of the "acid" type (hypo, sulphite, acetic acid, and alum) should be used

"Velox"

Dissolve in the order given

Metol	7 grs	0 8 gm
Hydroquinone	30 grs	3 5 gms
Sodium sulphite (cryst)	220 grs	25 gms
Sodium carbonate (cryst)	400 grs	45 gms
10% sol of potass bromide	10 to 20 drops	16 to 30 drops.
Water, up to	10 ozs	500 c c s

For *Vigorous Grade*, use above full strength, for *Soft* (or *Special*) *Grade*, dilute with equal bulk of water

Warm Tone Developer

(For *Vigorous* Velox only)

Expose for six times the normal, and develop in the following using 1 part of A added to 2 parts of B Development takes 6 to 10 minutes for sepia brown colour

A	Pure protosulphate of iron	1½ ozs
	Water	10 ozs
	Sulphuric acid	3 minims

The iron sulphate crystals must first be thoroughly dissolved The solution will be rather turbid, and the sulphuric acid ought to clear

it in a few minutes If it does not, the sulphate crystals were probably oxidised considerably, and one or two additional minims of sulphuric acid may be used till the solution becomes of a clear pale apple-green tint

B	Citrate of soda	5 ozs
	Citric acid	4 ozs
	Water	20 ozs

When ready to develop, add 1 part of A to 2 of B

Kodak Platinum Paper.

Developer for Warm Black Tones

Neutral potassium oxalate	4 ozs	200 gms
Water	20 ozs	1000 c c s

For Bluer Tones

Neutral potassium oxalate	2 ozs	100 gms
Potassium phosphate	1 oz	50 gms
Water	20 ozs	1000 c c s

Any potassium phosphate will do for this developer, but the one which gives by far the best results, and should be used if obtainable, is the mono-potassium di-hydric ortho-phosphate (KH_2PO_4)

The temperature of the developer should be from 60 to 65 F

Clearing bath —Hydrochloric acid, ½ oz , water, 20 ozs

"Eastman" Lantern Plates.

Gaslight -For Warm Tones

A	Water	16 ozs	600 c c s
	Hydroquinone	120 grs	10 gms
	Sodium sulphite (crystals)	1 oz	30 gms
B	Water	16 ozs.	600 c c s
	*Caustic soda	60 grs	5 gms.
	Potassium bromide	60 grs	5 gms
C	Water	16 ozs	600 c c s.
	*Ammonium carbonate	120 grs	10 gms
	Ammonium bromide	120 grs	10 gms

* The caustic soda should be fresh and dry The ammonium carbonate should be in clear lumps If covered with white, powdery bicarbonate from exposure to the atmosphere, this should be scraped off before weighing

For brown tones A, 1 oz , B, 1 oz and C, 2 drs

For purple tones A, 1 oz , B, 1 oz , and C, 3 drs

For red tones expose longer and use developer for purple tones

LETO PHOTO-MATERIALS CO., LTD.

Edwards Plates.

"ISO" AND "ORDINARY" PLATES

A	Pyro	¼ oz	12 5 gms
	Soda metabisulphite	¼ oz	12 5 gms
	Water	20 ozs	1000 c cs
B	Soda carbonate	3 ozs	150 gms
	Soda sulphite	1 oz	50 gms
	Water	20 ozs	1000 c cs

Use equal parts of A and B, adding 2 to 3 minims of 10 per cent potass bromide solution as necessary

"SPECIAL TRANSPARENCY" LANTERN PLATE

For Warm To

A	Pyro	1¼ oz	62 5 gms
	Soda sulphite	5 ozs	250 gms
	Citric acid	140 grs	16 gms
	Water to make	20 ozs	1000 c cs
B	Ammonium bromide	3¾ ozs	187 gms
	Liquor ammonia (880)	2½ ozs	125 c cs
	Water to make	20 ozs	1000 c cs

Use A, 1 part B, 1 part, water, 1[?] parts

"KRISTAL" (GASLIGHT) LANTERN PLATE

Developer for Warm Black Tones

Hydroquinone	120 grs	14 gms
Soda sulphite	2 ozs	100 gms
Potass carbonate	4 ozs	200 gms
Potass bromide	40 grs	4 5 gms
Water to make	20 ozs	1000 c cs

Use 1 part of the above mixed with 1 part of water Development should be complete in about 2 minutes

Leto Collodion Papers

PLATINO-MATT

For Brown Black and Warm Black Tones

The prints are first partly toned in the following gold bath Toning must not be carried on too far, but only until the prints seem to have changed colour A long immersion will yield blue-black and a short immersion brown-black tones in the subsequent platinum bath

Shortly before use only, make up as follows —

Acetate of soda	1 oz	30 gms
Gold chloride	1 gr	0 065 gm
Water	17 ozs	530 c cs

After toning, wash for a minute or two, and continue in the following platinum bath, until the desired effect has been obtained :—

Phosphoric acid	2 drs.	7.1 c.c.s.
Chloroplatinite of potash	7½ grs.	0.48 gm.
Water	9 ozs.	250 c.c.s.

Then wash in two to three changes of water and fix.

"JUNO" COLLODION P.O.P.

Toning Bath.

Ammonium sulphocyanide	90 grs.	10.3 gms.
Gold chloride	3 grs.	0.3 gm.
Water	20 ozs.	1000 c.c.s.

Fix for at least fifteen minutes in :—

Hypo	1 oz.	Water	15 ozs.

"PLATINO" COLLODIO CHLORIDE PAPER.

Platinum Toning Bath.

Citric acid	90 grs.	10.3 gms.
Potass. chloroplatinite	3 grs.	0.3 gm.
Water	20 ozs.	1000 c.c.s.

Brown Tones.—Do not print so deeply as for black tones. Wash in four changes of *lukewarm* water, and immerse in a very weak ammonia bath (say ½ oz. to 40 ozs. water) until they turn a uniform lemon yellow. Wash out the ammonia from the prints in at *least* six changes of water, and tone in the above platinum bath, and fix as usual. (It is important that the prints be free from ammonia to avoid staining in the platinum bath.)

Excellent warm sepia tones are obtained by first washing the prints as usual, and placing direct into the fixing bath (hyposulphite of soda, 1 oz., water, 15 ozs.). Fix for 15 minutes and wash for 1 to 1½ hours in several changes. Printing must not be carried on so far as for warm black tones.

Seltona (Self-Toning) Collodion Paper

For Warm Brown Tones.

Soak the prints for a minute or two in clean water, and place in the fixing bath as follows:—

Hypo	2 ozs.	100 gms.
Water	20 ozs.	1000 c.c.s.

(It is advisable to add a pinch of bicarbonate of soda to this solution.)

Fix for at least 12 to 15 minutes, then wash for 1 hour in running water, or 8 to 10 changes.

Dark Brown, Purple and Blue Tones.

Rinse the prints rapidly in two or three changes of clean water, and place for 5 to 10 minutes in the following :—

Common salt	1 oz.
Water	12 ozs.

or 4 good teaspoonfuls to ½ pint water. Rinse in clean water and fix as above.

Darker and bluer tones are obtained by placing the prints *direct* into the salt solution without previous washing. A stronger solution of salt up to 2 ozs. in 10 ozs. may be employed if desired.

Leto-Tintona Paper.

For sepia tones the prints are fixed in 1 in 20 hypo after washing.

For brown and purple tones, they are printed a little deeper and placed direct into

Common salt	1 oz.	100 gms.
Water	10 ozs.	1000 c.c.s.

for 10 minutes, being afterwards fixed and washed as for sepia tones.

For black tones, the paper is much over-printed and toned in:—

Citric acid	90 grs.	10.3 gms.
Sodium chloride	90 grs.	10.3 gms.
Potass. chloroplatinite	3 grs.	0.34 gm.
Water	20 ozs.	1000 c.c.s.

This deep printing and platinum bath are also used for Leto "Chamois" paper.

Leto "Bromide" Paper.

Amidol Developer.

Amidol	45 grs.	5.1 gms.
Soda sulphite	450 grs.	51 gms.
Potass. bromide	5 grs.	0.6 gm.
Water	20 oz.	1000 c.c.s.

An acid fixing bath is preferable: Soda sulphite, 1¼ oz., water, 50 ozs., to which add, drop by drop, glacial acetic acid, 2 drachms, and then hypo, 8 o.

Leto-Gaslight Paper

For Warm Black Tones.

A	Adurol Schering	¼ oz.	7.1 gms.
	Soda sulphite, cryst.	2 ozs.	56.7 gms.
	Water	12¼ ozs.	350 c.c.s.
B	Potass. carbonate	1½ oz.	42.5 gms.
	Water	12¼ ozs.	350 c.c.s.

Shortly before use, mix equal parts of each.

For Pure Black Tones.

Sodium carbonate	1½ ozs.	150 gms.
Sodium sulphite	¼ oz.	25 gms.
Metol	10 grs.	2.3 gms.
Hydroquinone	30 grs.	6.8 gms.
Potass. bromide (10 per cent. solution)	4 minims	9 c.c.s.
Water	10 ozs.	1000 c.c.s.

For correct exposure development should be complete in 10 to 30 seconds.

It is advisable to give plenty of exposure, and develop quickly. When fully developed rinse and fix.

Leto Pigment Paper.

Sensitizer

Ammonium bichromate	450 grs	50 gms
Sodium carbonate (cryst)	90 grs	10 gms
Water, to make	20 ozs	1000 c c s

For use, dilute one part with two parts of methylated spirit and use immediately

THE LUMIERE CO.

Lumiere Plates and Films.

Diaol (Diamidophenol) Developer

Sodium sulphite anhydrous	40 grs	5 gms
Dianol	260 grs	30 gms
Water	20 ozs	1000 c c s

This solution should be used quite fresh

A stock solution of the soda sulphite and water may be made and the dianol added dry in proportionate quantity at time of using

Lumiere's Citrate P.O.P.

Any of the ordinary toning methods may be employed, but the makers specially recommend the use of the following combined toning and fixing bath

A	Hypo	5 ozs	250 gms
	Alum	130 grs	15 gms
	Lead acetate	17 grs	2 gms
	Warm water	20 ozs	1000 c c s

Dissolve the hyposulphite and alum, and when cold add the lead acetate Allow to stand for several hours, and then filter carefully

B	Gold chloride	15 grs	1 gm
	Water	3½ ozs	100 c c s

To 100 parts of A add from 6 to 8 parts of B, according to tone required

Separate Toning and Fixing

Refined chalk	1½ oz	80 gms.
1 per cent solution of gold chloride	2 ozs	100 c c s
Distilled water .	20 ozs	1000 c c s

Allow to stand for 24 hours, then filter, and for use add 15 parts of above bath to 100 parts of water

After toning, rinse prints and transfer to a 1 per cent solution of alum for a few minutes, wash well, and fix in—

Fixing Bath

Hypo	3 ozs	150 gms
Soda bisulphite	1½ dr	10 c c s
Alum	30 grs.	3 gms
Water	20 ozs	1000 c c s

In this bath the prints will turn to a yellowish red, but will then change rapidly through brown to blue Take the prints from the bath when the desired tone is obtained, and wash, preferably in running water

Lumiere "Actinos" P.O.P.

Separate Toning

A	Sodium acetate	350 grs	40 gms
	Water	20 ozs	1000 c c s
B	Ammonium sulphocyanide	175 grs	20 gms
	Water	20 ozs	1000 c c s
C	Gold chloride	15 grs	1 gm
	Water	3½ ozs	100 c c s

Mix at time of use, A, 4 parts, B 4 parts C, 1 part

Lumiere Bromide Papers.

The developer most recommended is as follows -

Sodium sulphite (anhydrous)	170 grs	20 gms
Dianol	45 grs	5 gms
10 per cent solution of potass bromide	20 to 50 min	2 to 5 c c s
Water	20 ozs	1000 c c s

This developer should be freshly made for each batch of prints but should it be desired the soda solution can be made in bulk, and the diamidophenol added at the time of use

Lumiere "Radios" (Gaslight) Paper.

Developer for Black Tones

Sodium sulphite (anhydrous)	5 to 7 drs	30 to 50 gms
Dianol	40 grs	5 gms
Potass bromide (10 per cent solution)	25 drops	40 to 50 drops
Water	20 ozs	1000 c c s

For Warm Tones

Hydroquinone	5 drs	10 gms
Formosulphite	14 drs	25 gms
Potass bromide (10 per cent solution)	1½ dr	10 c c s
Water	20 ozs	250 c c s

Taking as a standard exposure that correct for black tones with developer given, and as a standard developer the above given for warm tones, the exposure and dilution of the developer for various tones should be as follows :—

	Greenish Blue	Green	Brown	Sepia	Red
Exposure	1	2		4	6
Addition of water to developer	0	1			

Autochrome Plates.

For the new developing formula recommended by the makers see under "Colour Photography" in "Epitome of Progress." The other formulæ are as follows :—

Reversing Solution.

C	Potass permanganate	2 gms.	70 grs.
	Sulphuric acid	10 c.c.s	6½ drs.
	Water	1000 „	80 ozs.

The sulphuric acid in C is the strong acid of 1.84 specific gravity. It should be added to the water, not *vice versa*.

Destroying Second Developer.

E	Solution C	50 c.c.s	1 oz.
	Water	1000 c.c.s	50 ozs.

Intensifier.

F	Pyro	3 gms.	26 grs.
	Citric acid	3 gms.	26 grs.
	Water	1000 c.c.s	20 ozs.
G	Silver nitrate	5 gms.	90 grs.
	Distilled water	100 c.c.s	4 ozs.
H	Potass permanganate	1 gm.	9 grs.
	Water	1000 c.c.s	20 ozs.

Fixing Solution.

I	Hypo	150 gms.	3 ozs.
	Soda bisulphite (solution)	50 c.c.s	1 oz.
	Water	1000 c.c.s	20 ozs.

Potass metabisulphite (7 gms. or 60 grs.) may be used in place of the soda bisulphite solution in making the fixing bath.

MARION AND CO., LTD.

Marion Plates

("*Supreme*," "*Academy*," *P.S.*, *etc.*)

PYRO-SODA DEVELOPER

A	Pyrogallic acid	1 oz.	12.5 gms.
	Sodium sulphite	8 ozs.	100 gms.
	Sulphuric acid	60 minims	1.5 gm.
	Water to make up	80 ozs.	1000 c.c.s.
B	Sodium carbonate	8 ozs.	100 gms.
	Potassium bromide	60 grs.	1.5 gm.
	Water to make up	80 ozs.	1000 c.c.s.

Mix in equal parts at time of using.

When very soft negatives are required or only a minimum exposure can be given, the bromide may be omitted.

PYRO-AMMONIA

A	Pyrogallic acid	1 oz.	100 gms.
	Ammonium bromide	1 oz.	100 gms.
	Citric acid	60 grs.	13 gms.
	Water to make up	10 ozs.	1000 c.c.s.
B	Strongest liquid ammonia (.880)	1½ ozs.	150 c.c.s.
	Water to make up	10 ozs.	1000 c.c.s.

Two ozs. (200 c.c.s.) of each of above separately made with water to 20 ozs. (1000 c.c.s.) form the solutions for use, equal parts being mixed together at the time of development.

Mariona P.O.P.

Toning Bath for Matt and Glossy

A. Gold chloride solution, 1 gr. per oz. (2.3 gms. per 1000 c.c.s.).

B. Ammonium sulphocyanide solution, 10 grs. per oz. (23 gms. per 1000 c.c.s.).

Toning Bath: A, 1 oz.; B, 1 oz.; water to 8 to 12 ozs.

For Glossy Only

A	Gold chloride, as above.		
B	Sodium carbonate	30 grs.	4.6 gms.
	Water	15 ozs.	1000 c.c.s.

A, 2½ ozs.; B, 2½ ozs.; water to make 20 to 30 ozs.

Platinum Toning for Matt P.O.P. and Mezzotint Paper

A	Water	15 ozs.	1000 c.c.s.
	Hydrochloric acid	5 minims	0.3 c.c.
	Potass chloroplatinite	15 grs.	2.3 gms.
B	Citric acid	300 grs.	46 gms.
	Sodium chloride	300 grs.	46 gms.
	Water	15 ozs.	1000 c.c.s.

A, 1 oz.; B, 1 oz.; water to 30 ozs.

Marion's Collodion P.O.P.

For Warm Black Tones—Platinum Toning Bath

Potass chloroplatinite	15 grs	1 gm
Phosphoric acid (sp gr 1 120)	2¼ drs	9 c c s
Water	35 ozs	1000 c c s

Remove prints as soon as they are of desired tone, which will be in from two to six minutes, according to age of bath Wash well before fixing

Blue Black Tones—Gold Toning Bath

Gold chloride	2 grs	0 13 gm
Borax	80 grs	5 gms
Water	25 ozs	700 c c s

Make up two hours before use

Keep prints in this bath until they assume a purple tone, then wash in several changes of water and transfer to platinum bath (given above) Remove when they reach a rich black

Sepia Tones

Wash prints in five or six changes of luke warm water to the last three of which add 1 per cent of liquid ammonia 0 880 (not stronger or blisters will be produced) When lemon-yellow wash in five or six changes of water and tone in the platinum bath Wash and fix as usual

Red Carbon Tones

Wash prints in three changes of water, then place in a bath of—

Common salt	1 teaspoonful
Water ..	40 ozs

As soon as they become yellow remove, rinse in water and place in the borax gold bath Just as they are reaching tone desired, again place them in salt bath to stop further toning, and, after rinsing in water, fix as usual

Brown and Dark-Blue Tones

Print dark, and treat as for red carbon tones, but tone in platinum bath only

Purple Tones

Print very dark Wash in three changes of water and place in the following bath —

Gold chloride (1 per cent solution)	1 oz	10 c c s
Acid hydrochloric pure	3 ozs	30 c c s
Water .	10 ozs	100 c c s

Less acid gives a blue tone More acid gives a purple tone Tone until desired colour is obtained Wash and fix as usual

Marion's Bromide Paper.

Amidol Developer

Amidol	40 grs	4 6 gms
Sodium sulphite	400 grs	46 gms
Potass bromide	10 grs	1 1 gm
Water to make up to	20 ozs	1000 c c s

Or other standard developer

Marion's "Quick Print (Gaslight)" Paper.

Amidol Developer

Sodium sulphite	200 grs	46 gms
Amidol	20 grs	4 6 gms
Potass bromide (10 % solution)	10 drops	35 drops
Water	10 ozs	1000 c c s

Adurol Developer for Cold Tones

Adurol	20 grs	4 6 gms
Sodium carbonate	200 grs	46 gms
Sodium sulphite	200 grs	46 gms
Potass bromide	5 grs	1 gm
Water to	10 ozs	1000 c c

Time of exposure with average negative, one inch magnesium ribbon burnt at one foot distant Time of development, one minute

For warm tones add extra bromide in proportion of 1 gr per oz (2 3 gms per litre) and give exposure with average negative of six inches magnesium ribbon burnt to one foot distant Time of development, four minutes

Marion's Lantern Plates.

(Gelatino Chloride and Chloro-Bromide

Hydroquinone	15 grs	3 4 gms
Metol	5 grs	1 1 gm
Sodium sulphite	200 grs	45 6 gms
Potass bromide	2 grs	0 45 gm
Sodium hydrate	20 grs	4 6 gms
Water to make	10 ozs	1000 c c

MAWSON AND SWAN.

Mawson Plates.

(*"Mawson," "Castle," "Electric," "Felix," and "Gladiator"*)

PYRO SODA DEVELOPER.

Stock Solution.

Pyrogallic acid	480 grs.	110 gms.
Potass metabisulphite	120 grs.	28 gms.
Distilled water to make	10 ozs.	1000 c.cs.

Dissolve the metabisulphite before adding the other ingredients.

A	Stock solution	1¼ ozs.	125 c.cs.
	Distilled water to make	10 ozs.	1000 c.cs.
B	Sodium carbonate (crystals)	360 grs.	82 gms.
	Sodium sulphite	480 grs.	110 gms.
	Distilled water to make	10 ozs.	1000 c.cs.

Use equal parts of A and B.

RODINAL DEVELOPER.

Rodinal	1 part.
Water	20 parts.

Mawson Ortho Plates, A. & B.

The above pyro soda formula, with the addition of 40 grs. (9 gms.) potass bromide to the stock solution, gives excellent results.

If under exposed, use a large proportion of B; if over exposed decrease the proportion of B, and add a few drops of a 10 per cent. solution of potass bromide.

AMIDOL DEVELOPER.

Amidol	100 grs.	23 gms.
Soda sulphite	1000 grs.	228 gms.
Potass bromide	10 grs.	2.3 gms.
Distilled water to make to	10 ozs. (1l.)	1000 c.cs.

Use 1 part to 3 parts water.

Mawson Photo-Mechanical Plates.

PYRO SODA DEVELOPER.

The pyro soda developer given above for Mawson "Castle" plates is used with the addition to the pyro stock solution of

Potass bromide	160 grs.	38 gms.

HYDROQUINONE DEVELOPER.

A	Hydroquinone	40 grs.	9 gms.
	Potass bromide	10 grs.	2 gms.
	Potass metabisulphite	40 grs.	9 gms.
	Distilled water to make up to (1l.)	10 ozs.	1000 c.cs.
B	Caustic potash (sticks)	80 grs.	18 gms.
	Distilled water to make up to (1l.)	10 ozs.	1000 c.cs.

Use equal parts of A and B mixed at time of developing.

Mawson X-Ray Plates.

A	Metol	40 grs	9 gms
	Hydroquinone	80 grs	18 gms
	Potass metabisulphite	80 grs	18 gms
	Potass bromide	10 grs	2 3 gms.
	Dist water to make	10 ozs	1000 c c
B	Sodium carbonate (cryst)	800 grs	180 gms.
	Sodium sulphite	800 grs	180 gms
	Dist water to make	10 ozs	1000 c c

Equal parts of A and B

Mawson Lantern Plates.

A negative of average density requires about 15 seconds at 1 foot from a No 6 bat's wing burner

Development begins rather slowly, especially with the hydroquinone formula, afterwards proceeding more rapidly

PYRO AMMONIA DEVELOPER

A	Pyrogallic acid	20 grs	1 5 gms
	Ammonium bromide	20 grs	4 5 gms
	Potass metabisulphite	50 grs	11 5 gms
	Distilled water to make up to (	10 ozs	1000 c c
B	Liq ammonia (880)	70 minims	15 c c s
	Distilled water to make up to (	10 ozs	1000 c c

Use equal parts of A and B mixed at time of developing.

HYDROQUINONE DEVELOPER

A	Hydroquinone	40 grs	9 gms
	Potass bromide	40 grs	9 gms
	Potass metabisulphite	40 grs	9 gms
	Distilled water to make up to (	10 ozs	1000 c c s
B	Caustic potash (sticks)	80 grs.	18 gms
	Distilled water to make up to (	10 ozs.	1000 c c s

Use equal parts of A and B mixed at time of developing

Clearing Solution

Hydrochloric acid .	4 oz (fl)	50 c c s
Saturated solution of alum, to	10 ozs (fl)	1000 c

SULPHOCYANIDE TONING SOLUTION

(For Blue-Black and Blue Tones)

A	Gold chloride	15 grs	1 gm
	Distilled water to make up	7½ ozs (fl.)	212 c c s.
B	Ammonium sulphocyanide	40 grs	3 gms
	Distilled water to make up	4 ozs (fl)	113 c c s

Use 1 part of A and 4 parts of B, mixed at time of using This order of mixing must not be reversed

Simplex Lantern Plates

Developer for Black Tones

Amidol	100 grs	20 gms
Sodium sulphite	1000 grs	200 gms.
Potass bromide	5 grs	1 gm
Distilled water to make	10 ozs	1000 c c

Use 1 part to 4 parts of water

OZOBROME, LIMITED.

The Ozobrome Process

Carbon Prints from Bromides

If fixed in the ordinary bath, the bromides should be hardened in—

Formalin	1 part	water 10 parts,

or—

Chrome alum	4 per cent solution,

in either case for ten minutes and then washed for 15 minutes and dried

Stock Acid Solution

Acid Bath B

Hydrochloric acid (pure)	1 o	100 c c s
Water	10 ozs	1000 c c s

Working Acid Solution

Water	25 ozs	1000 c c s
Stock acid solution	1 oz	40 c c s

Pigmenting Bath — A

Concentrated ozobrome solution (as sold)	1 part
Water	4 parts

Place the bromide print face upwards in cold water and sponge the surface to remove air bells. Immerse the pigment plaster in bath A until saturated (about 90 seconds) and then transfer to B for 5 to 15 seconds. Less immersion in acid gives greater contrast. Drain the plaster for a few seconds and apply to the bromide in the dish of water, place on a flat support and squeegee together with a flat squeegee. After 20 minutes' contact the plaster may be developed on the bleached bromide or transferred to another support.

Bromoil and Oil Ozobrome

See under these processes in "Epitome of Progress" for the use of the Ozobrome solution

The Ozotype Process

Instructions for the Ozotype process were given in the "1907 Almanac," page 1047

PAGET PRIZE PLATE COMPANY, LTD.

Paget Plates.

(XXXXX, "*Swift*," XXX, *and* "*Special Rapid*")

PYRO-SODA

No 1	Pyrogallic acid	1 oz	25 gms
	Sulphuric acid	5 minims	1 0 c c
	Distilled water to make	10 ozs	1000 c c s
No 2	Carbonate of soda	2 ozs	200 gms
	Sulphite of soda	2 ozs	200 gms
	Potass bromide	60 grs	14 gms
	Distilled water to make	10 ozs	1000 c c s

For studio use, 1 part of each and 2 parts of water (making 4 parts altogether) will be found about right. Such developer contains about 3 grs pyro and 22 each of carbonate and sulphite to each

METOL-HYDROQUINONE

Hydroquinone	55 grs	6 gms
Metol	14 gr	1 5 gm
Soda sulphite	1 oz	48 gms
Soda carbonate	1¼ oz	60 gm
Potass bromide	20 grs	25 gms
Water to make	20 oz	1000 c c s

Dissolve the sulphite in half the water, heated to about 150, dissolve hydroquinone in this and then add the metol, already dissolved in 20 times its weight of water Dissolve the bromide and carbonate in about a quarter of the water, add this solution to the above and make the whole up to the required bulk with water

Paget P.O.P.

Toning The following bath is strongly recommended in preference to any other –

Ammonium sulphocyanide	24 grs	3 4 gms
Gold chloride	2 grs	0 28 gm
Water	16 ozs	1000 c c s

If it is desired to tone more slowly, a small quantity of sulphite of sodium, equal in quantity to the gold used, should be added to the toning bath This makes the bath work more slowly without making any other difference

For decidedly *warm* tones (really pure light browns and red browns) the following formula is recommended –

Gold chloride	1 gr	0 15 gm
Ammonium sulphocyanide	8 grs	11 5 gms
Sodium sulphite	1 gr	0 15 gm
Water to make	16 ozs	1000 c c

Tone to the desired colour, judging by looking through Toning is slow, taking from 5 to 10 or 12 minutes When toned, wash the prints in water, fix and finish as usual

Developing

The Paget "partial development" process is given under "Standard Formulæ for the Principal Photographic Processes."

Paget Collodion Papers

COLLODIO-CHLORIDE P.O.P.

Gold Toning

Ammonium sulphocyanide	30 grs.	2 gms.
Gold chl.	2 grs.	0.13 gm.
Water	16 ozs.	450 c.c.s.

PLATINOID C.C. PAPER

A	Gold chloride	15 grs.	2 gms.
	Water	15 ozs.	1000 c.c.s.
B	Soda bicarbonate	120 grs.	16 gms.
	Distilled water	15 ozs.	1000 c.c.s.

For use, take 1 part A, 1 part B, and 28 parts water. The mixture does not keep; only enough for use should therefore be made up from A and B as required.

Tone prints to a chocolate or reddish purple colour. Wash for five minutes. Then tone again in:—

Potass. chloroplatinite	15 grs.	0.5 gm.
Dilute phosphoric acid (Acid Phosph. dil. B.P.)		50 c.c.s.
Water to make	60 ozs.	1000 c.c.

If a bluer black is desired it may be obtained by using ½ [illegible] of lactic acid in the second bath instead of 3 ozs. phosphoric acid.

The prints should remain in this bath until quite black. They are then washed and fixed as usual.

A very fine brown black may be obtained by the use of the chloroplatinite bath only. In this case the print should be placed, after first washing, in weak ammonia (say ½ oz. liquor ammonia 0.880 to the pint of water) for a few seconds, then washed again for a minute and toned.

Paget Self-Toning Papers

COLLODION

For warm brown tones wash print for 5 minutes and fix in:—

Hypo	3 ozs.	150 gms.
Water	20 ozs.	1000 c.c.s.

for 10 minutes, wash thoroughly and dry. If a colder tone be desired, *instead* of first washing, place print in—

Common salt	2 ozs.	100 gms.
Water	20 ozs.	1000 c.c.s.

for 5 minutes, then rinse in water and fix as above.

Platinum Toning

A fine olive black tone can be obtained in the following way -

Potassium chloroplatinite	15 grs	1 gm
Sodium chloride	150 grs	10 gms
Citric acid	150 grs	10 gms
Water to make	7½ ozs	220 c c s

For use take 1 part of stock solution and 10 parts water

The prints are first put into a bath of common salt 1 oz, water 10 ozs, for 5 minutes washed, and then placed in the platinum bath and kept constantly moving, until all trace of red has disappeared from the print when it is looked through This will take from 5 to 10 minutes Wash again for 5 minutes and fix in the ordinary hypo fixing bath

GELATINE ("SIMILI")

For coldest purple, fix in hypo,	8 oz in 20	for 6 or 7 minutes
„ warmer	„	8 to 4	6 „ 7 „
„ sepia	„	3 „ 2	10 „
„ brown or red	„	1½ „ 1 „	15 „

Fixing should be timed fairly close to above directions, and bath should be about 65 F

Paget Phosphate Paper.

See under "Phosphate Paper" in "Epitome of Pro

Paget Bromide Papers.

Metol	80 grs	9 1 gms
Hydroquinone	40 grs	4 6 gms
Soda sulphite	1½ ozs	6? 5 gms
Potass bromide	10 grs	1 1 gms
Potass carbonate	4 ozs	25 gms
Water to make	20 ozs	1000 c c s

This developer is made up in the order directed for the metol hydroquinone solution for Paget plates on an earlier page

The image should appear very quickly, and development will be complete in about 2 to 3 minutes Rinse in 3 changes of water and fix

To produce softer results the developer may be diluted with an equal quantity of water, or the hydroquinone may be omitted or reduced

"Gravura" (Gaslight) Papers.

FOR BLACK TONES, WITH No 1 OR No 2 PAPER

Metol	1 oz	6 gms
Sodium sulphite	8 ozs	48 gms
Sodium carbonate (cryst)	10 ozs	60 gms
Potass bromide	16 grs	0 25 gm
Water to make	160 ozs (1 gallon)	1000 c c s

The above formula gives good gradation and an excellent black tone,

but it *cannot* be used for colours. Development is complete in about 10 to 20 seconds.

For prevention of stress marks add to each ounce of developer at time of use about 15 minims of :—

Potass. cyanide	200 grs.	22 gms.
Water	20 ozs.	1000 c.c.s.

Warm Tones, with No. 2 Paper only

H.	Hydroquinone	1 oz.	55 grs.	6 gms.
	Metol	¼ oz.	14 grs.	1·5 gm.
	Sodium sulphite	8 ozs.	1 oz.	48 gms.
	Sodium carbonate	10 ozs.	1¼ oz.	60 gms.
	Potass. bromide	16 grs.	2 grs.	0·25 gm.
	Water to make	160 ozs. (1 gallon)	20 ozs.	1000 c.c.s.

A. C.	Ammonium bromide	1 oz.	50 gms.
	Ammonium carbonate	1 oz.	50 gms.
	Water to make	20 ozs.	1000 c.c.s.

Development for Colours.

Cool to Warm Sepia. Exposure 5 to 6 times Black.

Stock solution H.	1 oz.	30 c.c.s.
Stock solution A. C.	50 - 60 min.	3–3·5 c.c.s.
Water to make	6 oz.	170 c.c.s.

Warm Brown to Red. Exposure—6 to 8 times Black.

Stock solution H.	1 oz.	30 c.c.s.
Stock solution A. C.	¼ oz.	7 c.c.s.
Water to make	8 ozs.	230 c.c.s.

Red chalk. Exposure 8 to 10 times black.

Stock solution H.	1 oz.	30 c.c.s.
Stock solution A. C.	½ oz.	15 c.c.s.
Water to make	20 ozs.	570 c.c.s.

Red development may take 5 minutes or more.

Clearing Solution.

To remove friction marks and improve colour and clearness of prints.

No. 1.	Hypo	1 oz.	50 gms.
	Water	20 ozs.	1000 c.c.s.
No. 2.	Potass. ferricyanide	30 grs.	14 gms.
	Water	5 ozs.	1000 c.c.s.

For use, add ½ drachm of No. 2 to each ounce of No. 1, and lay the print in the mixture, in a clean dish. The marks can then be easily removed by gentle rubbing with a pad of cotton wool. Wash and dry the print as usual.

"Paget" Lantern Plates.

No 1	Hydroquinone	½ oz	25 gms
	Sulphurous acid B P	¼ oz	12 5 gms
	Potassium bromide	60 grs	6 8 gms
	Water to	20 ozs	1000 c c s
No 2	Caustic soda	½ oz	25 gms
	Sodium sulphite	2½ ozs	125 gms
	Water to	20 ozs	1000 c c s

For Warm Tones

No 3	Bromide of ammonium	1 oz	50 gms
	Carbonate of ammonium	1 oz	50 gms
	Water to	20 ozs	1000 c c s

Carbonate of ammonium should be in clear lumps, if from exposure to the air it has become coated with the white powdery bicarbonate, the latter should be scraped off

The following table shows how the developer should be used for black and warm tones -

Relative Time of Exposure	Constitution Developer	Time of Development	Colour of Deposit
30 secs	No 1 ½ oz No 2 ½ oz Water to make 2 ozs	2½ to 3 minutes	Black
One minute	No 1 ½ oz No 2 ¼ oz No 3 100 minims Water to make 2 ozs	5 minutes	Brown
One and a half minutes	No 1 ½ oz No 2 ¼ oz No 3 200 minims Water to make 2 ozs	10 minute	Purple brown
Three minutes	No 1 ½ oz No 2 ¼ oz No 3 250 minims Water to make 2 ozs	12 minutes	Purple
Five minutes	No 1 ½ oz No 2 ¼ oz No 3 300 minims Water to make 2 ozs	15 minutes	Red

"Gravura" (Gaslight) Lantern Plates.

For black tones these are developed with the second (H) formula given above for "Gravura" paper. For warm tones in every case the water added should be only half the quantity mentioned.

RAJAR, LTD.

"Rajar" Plates.

Developer.

A	Pyro	½ oz.	25 gms.
	Potass metabisulphite	¼ oz.	12.5 gms.
	Water	40 ozs.	1000 c.c.
B	Soda sulphite	2 ozs.	100 gms.
	Soda carbonate	2 ozs.	100 gms.
	Potass bromide	5 grs.	0.6 gm.
	Water	20 ozs.	1000 c.c.

Use equal parts of A and B.

Cleron Roll and Flat Films.

A	Potass metabisulphite	30 grs.	3.5 gms.
	Pyro	¼ oz.	12.5 gm.
	Water	20 ozs.	1000 c.c.
B	Sodium carbonate	2 ozs.	100 gms.
	Sodium sulphite	2 ozs.	100 gms.
	Potass bromide	10 grs.	1 gm.
	Water	20 ozs.	1000 "

For correct exposure, A, 1 part; B, 1 part.

For under-exposure, A, 1 part; B, 2 parts; water, 1 part.

For over-exposure, A, 2 parts; B, 1 part, with 10 to 20 drops 10 per cent. potass bromide solution per ounce of mixed developer.

"Rajar" P.O.P.

Toning Bath.

Ammonium sulphocyanide	20 grs.	2.3 gms.
Gold chloride	2 grs.	0.23 gm.
Water	20 ozs.	1000 c.c.s.

This bath produces dark brown to purple black tones, but if warm

tones are desired it is advisable to dilute the bath with the following solution :—

Sodium sulphite	2 grs.	0.23 gm.
Water	20 ozs.	1000 c.c.s.

Sepia Tones on Matt Paper

Stock Solutions.

A.	Potass. chloroplatinite	15 grs.	1 gm.
	Water	15 ozs.	425 c.c.s.
	Hydrochloric acid	5 drops	5 drops

Mix the acid with the water and add the chloroplatinite.

B.	Citric acid	400 grs.	45 gms.
	Common salt	400 grs.	45 gms.
	Water	20 ozs.	1000 c.c.

Toning bath: A, 1 oz.; B, ½ oz.; water, 15 ozs.

"Rajar" C.C. Paper

Wash and tone in:

Ammonium sulphocyanide	21 grs.	1.4 gm.
Gold chloride	4 grs.	0.26 gm.
Water	25 ozs.	710 c.c.s.

Matt Paper.

Print till shadows bronze, wash and tone in:

Sodium acetate	100 grs.	11.4 gms.
Gold chloride	2½ grs.	0.28 gm.
Water	20 ozs.	1000 c.c.s.

again washing and toning in :—

Citric acid	150 grs.	17.1 gms.
Potass. chloroplatinite	10 grs.	1.1 gm.
Water	20 ozs.	1000 c.c.s.

"Rajar" Self-toning P.O.P.

When printed fix in the baths described below, then wash for an hour in water.

Depth of Printing	Fixing bath To the pint water		
Very dark (shadows blocked)	6 ozs. hypo	6 minutes	Purple
Fairly deep	3 ozs. hypo	10 minutes	Sepia.
Usual depth	2 ozs. hypo	10 minutes	Brown
	1 oz. hypo	15 minutes	Red brown

For purple-brown to purple tones, particularly when printing from thin negatives, place prints without washing in

Ammonium sulphocyanide	20 grs.	2.3 grs.
Water	20 ozs.	1000 c.c.s.

for 3 to 5 minutes, wash for 7 minutes in running water and fix for 10 minutes in 1 : 10 hypo.

The gold platinum toning given above for ordinary P.O.P. serves well for black and olive-black tones on the matt self-toning paper.

"Rajar" Bromide Paper.

Developer.

Metol	8 grs.	0.9 gm.
Hydroquinone	30 grs.	3.5 gms.
Sodium sulphite	½ oz.	37.5 gms.
Sodium carbonate	½ oz.	37.5 gms.
Potass bromide	20 grs.	2.3 gms.
Water	20 ozs.	1000 c.c.s.

"Rajar" Gaslight Papers.

Developer for Black Tones on Ordinary and "Varicolor."

Potass metabisulphite	20 grs.	2.3 gms.
Metol	16 grs.	1.8 gms.
Hydroquinone	60 grs.	6.8 gms.
Sodium sulphite	480 grs.	55 gms.
Sodium carbonate	800 grs.	91 gms.
Potass bromide	2 grs.	0.2 gm.
Water	20 ozs.	1000 c.c.

WARM TONES ON "VARICOLOR."

Water	20 ozs.	1000 c.c.
Soda sulphite	2½ ozs.	125 gms.
Soda carbonate	5 ozs.	250 gms.
Hydroquinone	150 grs.	17 gms.
Potass bromide	100 grs.	11.4 gms.

Tone required	Exposures Times for Black Tone	Developer
Green-black	same	D, solution
Sepia	2	D, 1 oz., water 3 ozs.
Brown	4	D, 1 oz., water 10 ozs.
Red chalk	6	D, 1 oz., water, 20 ozs.

ROTARY PHOTOGRAPHIC CO., LTD.

"Rotograph" Negative Paper.

A	Ortol	1 oz	16 5 gms
	Potass metabisulphite	½ oz	8 2 gms
	Water	60 ozs	1000 c c s
B	Sodium carbonate	12 ozs	200 gms
	Sodium sulphite	8 ozs	130 gms
	Water	60 ozs	1000 c c s

For use take A, 1 part, B 1 part, water to make 10 parts

This developer is most suitable when working from harsh transparencies since, like amidol it tends to softness The best developer for negative paper is ferrous oxalate or ferrous citrate

The paper should be fixed in an "acid" bath

When dry, it is sufficiently transparent to print quickly without further treatment If, however, great transparency is required, the following mixture should be rubbed into the back of the paper with cotton wool

Canada balsam	1 oz
Turpentine	5 ozs

"Roto" P O P.

Toning

A	Ammonium sulphocyanide	1 oz	100 gms
	Water to make ..	10 ozs	1000 c c s
B	Gold chloride	15 grs.	17 0 gms
	Water	15 drs	1000 c c s

For purple tones, A, 3 drams, water, 20 ozs B, 1½ drams For warm brown tones, A, 2 drams sodium sulphite, 1 gr, water, 20 ozs B, 1 dram

FOR MATT P O.P

Sodium acetate	60 grs	4 gms
Borax	80 grs	5 2 gms
Gold chloride	2 grs	0 13 gm
Water to make .	35 ozs	1000 c c s

"Rotary" Collodio-Chloride P.O P.

Toning Baths for the Matt Paper

Sodium acetate .	96 grs	2 gms
Chloride of gold	2½ grs	5 c c s of 1 % solution
Distilled water	20 ozs	200 c c.s

Make this bath up several hours before use

The prints should be toned in this bath only until they commence

to change colour. Then wash thoroughly for a few minutes and place in—

Potassium chloroplatinite	12 grs.	1 gm.
Citric acid, pure .	180 grs.	15 gms.
Distilled water	20 ozs.	800 c.c.s.

Make this bath up about an hour before use.

The prints should remain till the desired tone is attained. The tone passes from red to brown, brownish black, blue-black to pure black.

Very fine warm and permanent tones, somewhat similar to platinum prints, may be obtained merely by use of the above platinum bath, without the preliminary gold bath.

Red, sepia and violet tones can be obtained by short or long toning with the gold bath alone.

Toning Bath for the Glossy Paper.

After washing, the prints should be immersed in the following toning bath:—

Sodium acetate (fused)	530 grs.	5.5 gms.
Ammonium sulphocyanide	48 grs.	0.5 gm.
Distilled water	20 ozs.	100 c.c.s.
Chloride of gold	½-¾ gr.	6 to 8 c.c.s. of 1% solution

Make this bath up several hours before use.

Tone to any point the finished prints are required to be, wash, fix and wash.

"Rotona" P.O.P.

Prints are fixed for not less than 8 minutes in 20 per cent. hypo containing a little bicarbonate of soda.

For colder tones, use stronger hypo solution, up to 30 per cent., or without preliminary rinse, place prints in a solution of ordinary salt (2 ozs. of salt to 20 ozs. of water) for 3 to 5 minutes, then fix and complete the print in 20 per cent. hypo as given above for warm tones.

Considerable variation of tones is obtainable by altering the strength of salt and hypo, whether for cold or warm tones, but the above quantities are the minimum to be used for yielding permanent results.

"Rotograph" Bromide Papers.

Metol-Hydroquinone Developer.

Metol .	50 grs.	5.7 gms.
Hydroquinone	40 grs.	4.6 gms.
Sodium sulphite	500 grs.	57 gms.
Potass. bromide	25 grs.	2.9 gms.
Sodium carbonate .	500 grs.	57 gms.
Water (distilled or boiled) to .	20 ozs.	1000 c.c.s.

Amidol Developer

Sodium sulphite	200 grs	23 gms
Potass bromide	1 gr	0 1 gm
Amidol	20 grs	0 7 gm
Water to	6 ozs	1000 c c

Dilute 1 part of the above with 4 parts of water, and apply to the paper, as soon as the shadows have developed pour off, and apply the strong solution till sufficient density is obtained, then pour off, wash well, and fix This method gives rich blacks with brilliant whites

"Rotox" (Gaslight) Paper.

Rodinal Developer

Rodinal	1 oz	50 c c s
Water	20 ozs	1000 c c

Add a few drops 10 bromide solution as required

Metol-Hydroquinone

Sodium carbonate	2½ ozs	125 gms
Sodium sulphite	1 oz	50 gms
Metol	16 grs	1 8 gm
Hydroquinone	55 grs	6 3 gms
Potass bromide	3 grs	0 35 gm
Water	20 ozs	1000 c c s

Development takes place very quickly If correctly exposed, the print attains full density in 5 to 10 seconds

THE CARBOGRAPH PROCESS

For this process of pigment printing and enlarging direct see under "Epitome of Progress" 1909 Almanac, p 669

W. W. ROUCH AND CO

Developer Stock Solutions

A.	Pyro . .	1 oz	100 gms
	Sodium sulphite	4 ozs	400 gms
	Water to make	10 ozs.	1000 c.c s

Dissolve the sulphite of soda in hot water, and, when cold, add the pyrogallic acid

B	Ammonium bromide	1 oz	100 gms
	Water to make	10 ozs	1000 c c s
C	Liquor ammonia (880)	3 ozs	300 c c s
	Water to make .	10 ozs	1000 c c s

R. W. THOMAS & CO, LTD.

Thomas's Lantern Plates.

For Black and Warm Tones

No 1	Hydroquinine	160 grs	10 gms
	Sodium sulphite	2 ozs	60 gms
	Citric acid .	60 grs	4 gms
	Potassium bromide	40 grs	2½ gms
	Water to	20 ozs	600 c c s
No 2	Sodium hydrate	160 grs	10 gms
	Water to	20 ozs.	600 c c s
No 3	Ammonium bromide	2 ozs	60 gms
	Water to	20 ozs	600 c c s
No 4	Ammonium carbonate	2 ozs	60 gms
	Water to	20 ozs	600 c c s

For Black Tones

No 1	½ oz	15 c c s
No 2	½ oz	15 c c s
Water to	2 ozs	60 c c s

For Brown Tones

No 1	½ oz	15 c c s
No 2	½ oz	15 c c s
No 3	15 minims	1 c c
No 4	15 minims	1 c c
Water to	2 ozs	60 c c s

For Purple Tones

No 1	½ oz	15 c c s
No 2	½ oz	15 c c s
No 3	30 minims	2 c c s
No 4	30 minims	2 c c s
Water to	2 ozs	60 c c s

For Red Tones

No 1	½ oz	15 c c s
No 2	½ oz	15 c c s
No 3	90 minims	6 c c s
No 4	90 minims	6 c c s
Water to	2 ozs	60 c c s

The relative times of exposure and development for these tones are—

	Black	Brown	Purple	Red
Exposure	30 secs at 24 in	30 secs at 6 in	30 secs at 5 in	[illegible] secs at 5 in
Development	4 minutes	10 minutes	18 minutes	30 minutes

WARWICK DRY PLATE CO.

(*"Special Rapid," "Double Instantaneous," "Rainbow," and "Warpress" plates*)

A	Pyro	1 oz	12 5 gms.
	Nitric acid	20 drops	10 drops
	Water	80 ozs	1000 c c.s

B	Soda sulphite	10 ozs	112 5 gms
	Soda carbonate, crystal	9 ozs	125 gms
	Water	80 ozs	1000 c c s.

For correct exposure, use equal parts of A and B

For under-exposure, use more B

For over exposure, use more A, or add a few drops of 10 per cent potass bromide solution

For correct exposure, no bromide is necessary

Hydroquinone

No 1	Water	20 ozs	1000 c c s
	Hydroquinone	120 grs	14 gms
	Sodium sulphite	2 ozs	100 gms
No 2	Water	20 ozs	1000 c c s
	Potass carbonate	4 oz	200 gms
	Potass bromide	30 grs	3 5 gms

For use take equal parts of each

WELLINGTON AND WARD.

Wellington Plates.

("*Speedy*," "*Extra Speedy*," *and* "*Landscape*")

Pyro-Ammonia Developer

No 1	Pyrogallic acid	1 oz	100 gms
	Sodium sulphite	2 ozs	200 gms
	Citric acid	40 grs	9 2 gms
	Water to	10 ozs	1000 c c s
No 2	Ammonia (0 880)	1 oz	100 c c s
	Water to	10 oz	1000 c c s
No 3	Ammonium bromide	1 oz	100 gms
	Water to	10 ozs	1000 c c s

Take 10 minims (2 c c s) of No 1, 10 minims of No 2, and 5 minims (1 c c) of No 3 to each ounce (100 c c s) of water

Pyro Soda Developer

No 1	Pyrogallic acid	1 oz	100 gms
	Sodium sulphite	2 ozs	200 gms
	Citric acid	40 grs	9 2 gms
	Water to	10 ozs	1000 c c s
No 2	Sodium carbonate	8 ozs	100 gms
	Sodium sulphite	8 ozs	100 gms
	Water to	80 ozs	1000 c c s

Normal Work Take 1 oz of No 2 and 1 dr. of No 1, with water 1 oz

Studio Work —Take 1 oz of No 2 and ½ dr of No 1, with water 1 oz

"Press" Plate

Metol-Hydroquinone Developer

A	Water	40 ozs	1000 c c s
	Metol	70 grs	4 gms
	Hydrequinone	100 grs	5 7 gms
	Soda sulphite	4 ozs	100 gms
B	Water	40 ozs	1000 c c s
	Soda carbonate	6 ozs	150 gms

Equal parts of A and B

Wellington "Ortho Process" Plates

Hydroquinone Developer

Hydroquinone	80 grs	9 1 gms
Sodium sulphite	1 oz	50 gms
Potass hydrate	80 grs	9 1 gms
Potass bromide	10 grs	1 1 gm
Water	20 ozs	1000 c c s

Pyro Soda

No 1	Pyrogallic acid		100 gms
	Sodium sulphite		200 gms
	Citric acid	40 grs	9 1 gms
	Water to	10 ozs	1000 c c s
No 2	Sodium carbonate	8 ozs	100 gms
	Sodium sulphite	8 ozs	100 gms
	Potass bromid	40 grs	1 1 gm
	Water to	80 ozs	1000 c c s

No 1, 1 dr No 2, 1 oz

"Wellington" Roll Films

The pyro-soda developer for "Speedy" plates is used for the films, using -No 1, 1 drachm, No 2, 1 oz , water 1 oz

For over-exposed negatives, add 10 to 20 drops of 10 % bromide solution per 4 ozs of developer

Wellington "Watah" Plates

(Self-developing)

Developer

For a quarter-plate .	1 oz of water
For a half-plate	2 ozs of water
For a whole-plate	4 ozs of water

For normal exposure it is best to have the water at a temperature of 60 deg Fahr Gently rock the dish for the first minute or two, in order to assist the soluble backing to dissolve

For under-exposure add three to four times the original quantity of water, raise the temperature of same to 70 deg Fahr , and continue development for 15 minutes

"Wellington" P.O.P.

ORDINARY

Formate Toning Bath.

Sodium formate	15 grs.	0.85 gm.
Sodium bicarbonate	3 grs.	0.17 gm.
Gold chloride	2 grs.	0.11 gm.
Water (distilled)	40 ozs.	1000 c.c.s.

The bath is ready for use as soon as made up; it will not keep.

Phosphate Toning Bath.

Phosphate of soda	60 grs.	3.4 gms.
Gold chloride	2 grs.	0.11 gm.
Water	40 ozs.	1000 c.c.s.

This bath should be allowed to stand one hour before using; it will not keep. The above quantity is sufficient for 24 half-plates.

"WELLINGTON" SPECIAL AND "CARBON" P.O.P.

Well wash the prints previous to immersion in the toning bath.

Ammonium sulphocyanide	20 grs.	2.8 gms.
Gold chloride	2 grs.	0.3 gm.
Water	16 ozs.	1000 c.c.s.

The tone is to be entirely judged by the surface, and not by looking through the print. Always undertone, as the finished print becomes very much colder when dry.

"Wellington" Self-Toning Paper.

Immerse prints direct, without washing, in the following:—

Hyposulphite of soda	6 ozs.	300 gms.
Water	20 ozs.	1000 c.c.s.

The fixing bath should be rendered alkaline by the addition of 30 grains (3.5 gms.) of bicarbonate of soda, which prevents sulphur toning and ensures greater permanency of the print.

Fix until desired tone is reached, which should not be less than over [illegible] minutes; then wash thoroughly.

"Wellington" Bromide Papers.

Amidol is recommended as the most reliable developer for general purposes, although any other may be used.

Amidol	50 grs.	5.7 gms.
Soda sulphite	650 grs.	74 gms.
Potass bromide	10 grs.	1.1 gm.
Water	20 ozs.	1000 c.c.s.

This developer should be used within three days of mixing.

It is often recommended to keep a stock solution of sodium sulphite by itself, and to take some of this when wanted and add the amidol to

it. *Experience shows that this will not do*, as amidol when used with stale sulphite solution develops very slowly, and there is a great loss of brilliancy in the resulting prints. The developer given above should therefore be mixed up as directed, and used within three days of mixing.

Metol-Hydroquinone Developer.

Metol .	50 grs.	6 gms.
Hydroquinone	15 grs.	1.7 gm.
Sulphite of soda	500 grs.	57 gm.
Potass bromide	10 grs.	1.1 gm.
Potass carbonate	100 grs.	11 gms.
Water	20 ozs.	1000 c.c.

Dissolve the metol in the water first.

Clearing and Reducing Bromide Prints.

In clearing up and brightening up a bromide print, removing surface markings or yellow stains or slight fog, the following bath will be found of great service. It should be applied after fixing and washing, the prints being left in until the desired clearing has taken place, and then removed and well washed:—

Thiocarbamide	20 grs.	4.6
Citric acid	10 grs.	2.3
Water	10 ozs.	1000

This bath will not work unless all traces of hypo have been removed from the print.

Bright Prints from Very Weak Negatives.

The following method will be found to give bright vigorous prints from flat negatives when every other means has failed:—

Expose the bromide paper in the usual way, developing it as long as any increase in depth is seen to be gained, ignoring altogether the discolouration of the high-lights—over-develop it, in fact. After fixing and washing, pour over it the following reducing solution until it is seen to be considerably lighter; when it is, at once plunge into clean hypo for a few minutes. If it is not yet light enough it may be again washed, treated with reducer, and fixed. When it is seen that any further reduction will render the blacks grey, it is washed and dried. Many a negative otherwise quite useless may in this way be saved:—

Potassium iodide	30 grs.	6.8 gms.
Water	10 ozs.	1000 c.c.s
Iodine	3 grs.	0.7 gm.

With this bath the whites of the print will assume a dark blue tint, owing to the formation of iodide of starch due to the sizing of the paper; this immediately vanishes upon placing in the hypo solution.

"Wellington" S.C.P.

Slow Contact Paper

Metol	10 grs	2 3 gms
Hydroquinone	30 grs	6 8 gms
Sulphite of soda (cryst.)	350 grs	80 gms
Carbonate of soda (cryst.)	350 grs	80 gms
Bromide of potassium	3 grs	0 7 gm
Water	10 ozs	1000 c.c.

Dissolve the above in the order named

For very brilliant blue black tones a suitable developer is

Sulphite of soda	500 grs	114 gms
Amidol	50 grs	11 4 gms
Bromide of potassium	2 grs	0 46 gm
Water	10 ozs	1000 c.c.s

This developer keeps only three days, after that time it should be discarded and fresh made up

"Wellington" Lantern Plates

For Cold Tone

The [illegible] solution [illegible] given [illegible] for Wellington Ortho [illegible] plates [illegible]

Developer for Warm Black Tone

Three stock solutions of pyro, ammonia and bromide are prepared as given above for "Speedy" plates. These are used as follows Take 30 minims of No 1, 60 minims of No 2 and 30 minims of No 3 with water 1 oz. This is for warm black tones. Time of development, two minutes

For warmer tones increase the exposure four to six times, also increasing No 3 up to 90 minims. Time of development, five to six minutes

WELLINGTON S.C.P. LANTERN PLATE

De[illegible]

A	Metol	20 grs	2 3 gms
	Sodium sulphite	200 grs	23 gms
	Sodium carbonate	800 grs	91 gm
	Hydroquinone	20 grs	2 3 gms
	Potass bromide	20 grs	2 3 gm
	Water	20 ozs	1000 c.c.s

Warm Tones

Increase of the bromide up to 20 grs per ounce of developer gives very pleasing warm tone

B	Ammonium carbonate	1 oz	10 gm
	Ammonium bromide	1 oz	10 gms
	Water	10 grs	

For warm brown to sepia tones, take A, 1 oz B, 1 drachm

For very warm reddish tones, take A, 1 oz B, 2 drachms

WRATTEN & WAINWRIGHT, LTD.

Wratten Plates.

Ten per Cent. Pyro and Ammonia.

A	Liquor ammonia	1 oz.	100 c.c.s.
	Potass bromide	100 grs.	21 gms.
	Water	10 ozs.	1000 c.c.s.
B	Pyro	1 oz.	100 gms.
	Citric acid	60 grs.	12 gms.
	Or		
	Sulphuric acid	1 dr.	6 c.c.
	Water	10 ozs.	1000 c.c.s.

For use with "I.D.S." and "Speed" Plates, the bromide in solution A should read

Potass bromide	110 grs.	22 gms.

For instantaneous and ordinary take from 60 (3 c.c.s.) to 90 minims (5 c.c.s.), and for "I.D.S." and "Speed" plates 90 minims (5 c.c.s.) of solution B, dilute with from 2 to 4 ozs. (60 to 120 c.c.s.) of water, and add 100 minims (6 c.c.s.) of solution A.

It is better to add solution A by instalments as development proceeds, unless the exposure is known to be either insufficient or quite accurate, in which cases it may be in one quantity.

Pyro Soda.

We recommend this developer for studio and hand camera work.

No. 1	Sodium sulphite	6 ozs.	75 gms.
	Water	80 ozs.	1000 c.c.s.
	Sulphuric acid	1 dr.	1.5 c.c.
	Pyro	1 oz.	15 gms.
No. 2	Sodium carbonate	6 ozs.	75 gms.
	Water	80 ozs.	1000 c.c.s.

For use, take equal parts of Nos. 1 and 2.

For denser negatives use the following more concentrated developer:—

No. 3	Sodium sulphite	6 ozs.	100 gms.
	Water	60 ozs.	1000 c.c.
	Sulphuric acid	1 dr.	2 c.c.s.
	Pyro	1 oz.	17 gms.
No. 4	Sodium carbonate	6 ozs.	100 gms.
	Water	60 ozs.	1000 c.c.

Take equal parts of Nos. 3 and 4.

For "Verichrome," "Allochrome," "Wratten Panchromatic," and "Bathed" Plates.

Metol	44 grs	10 gms
Hydroquinone	22 grs	5 gms
Sodium sulphite	1 oz	100 gms
Sodium carbonate	1 oz	100 gms
Water	60 ozs	6000 c.c.

For Process and [illegible] Plates.

A	Hydroquinone	1 oz	[illegible] gms
	Potass metabisulphite	1	[illegible] gms
	Potass bromide	1	[illegible] gms
	Water	10 ozs	1000 c.c.
B	Caustic potash pure	[illegible]	[illegible]
	Water	10 ozs	1000 c.c.

Use equal parts of A and B and develop for three minutes.

Wratten Lantern Plates.

([illegible])

[illegible]

A	Metol hydroquinone [illegible] but [illegible] above for Verichrome plates.		
B	Ammonium bromide	1	100 gms
	Ammonium carbonate	1 oz	100 gms
	Water	10 ozs	1000 c.c.
C	Hypo	1 oz	100 gms
	Water	10 ozs	1000 c.c.

Develop as follows: [illegible] the [illegible] and mix the developer according to the colour required.

Measure the time from the pouring on of the developer to the appearance of the image. Multiply that time by 8 and develop for the total time thus found.

Tone	Developer to contain: Drs.	Drs.	Drs.	Factor Multiple	Development time in minutes at 60° F.
Warm black	7½ A	[illegible] B		[illegible]	[illegible]
Cool sepia	7 A	1 B		[illegible]	[illegible]
Warm sepia	6[illegible] A	1½ B		[illegible]	8
Sepia brown	6 A	2 B		6	10
Brown	6½ A	[illegible] B	1 C	[illegible]	[illegible]
Brown purple	6 A	1 B	1 C	[illegible]	[illegible]
Purple	[illegible] A	2 B	½ C	10	[illegible]
Carmine	[illegible] A	[illegible] B	½ C	18	20

Thiocarbamide Developer.

Thiocarbamide	66 grs.	7.5 gms.
Ammonium bromide	22 grs.	2.5 gms.
Water	20 ozs.	1000 c.c.

The following table gives the exposure and developing factors for the production of blue tones with thiocarbamide:—

	Developer	Multiple
Dead black (Neutral)	7 A + 4B + ½T	2
Blue Black	6 A + 1½B + ½T	4
Blue	5½A + 2 B + ½T	8
Violet	5 A + 2½B + ½T	16

The time of development with thiocarbamide depends so greatly on the temperature that [illegible] is necessary. Neither time nor factorial methods are of any use.

CHAS. ZIMMERMANN & CO., LTD.

"Agfa" Plates.

Formulae.

[illegible]

In cases of normal exposure develop with

Rodinal	1 part
Water	20 parts

In cases of over-exposure with

Rodinal	1 part
Water	10—20 parts

(adding an ample quantity of solution of potassium bromide, 1 : 10) and in cases of under-exposure use

Rodinal	1 part
Water	20—40 parts

If development has been performed with an alkaline developer, such as rodinal, eikonogen, metol, pyro, etc., the negative will be quite clear after fixing, but should ferrous oxalate or amidol have been used, there will in all probability be a red colouring of the gelatine, in which case, after fixing, give the plate a five minutes' wash and transfer to a bath of soda carb. 10 per cent. for seven minutes, wash again and replace in the acid fixing bath for ten minutes, and then wash as usual.

When being subsequently intensified or reduced the red colour may reappear, especially when mercury intensification is being employed. In such a case immerse the plate in a 10 per cent. soda carb. solution

for 10 minutes, and then wash until the colour has gone (about one hour).

Chromo Plates

Metol-Hydroquinone Developer

Metol	18 grs.	5 gms.
Hydroquinone	72 grs.	7.5 gms.
Soda sulphite	2 ozs.	100 gms.
Potass. carbonate	192 grs.	20 gms.
Potass. bromide	10 grs.	1 gm.
Water	20 oz.	1000 c.c.s.

For softer negatives use [illegible] 1 in 20.

"Crossed Swords" P.O.P.

For Carbon Purple Tone

Water	19 oz.	1000 c.c.
Borax	11 grs.	5 gm.
Chloride of gold	1 gr.	0.13 gm.

Must be made up two hours before use, but does not keep well.

Print to about required colour, not too deeply, wash in three changes of water, immerse in water 20 ozs., salt 2 drams, until the print has turned orange yellow. Wash once and then tone. When a very slightly lighter colour than desired is obtained, replace in the salt solution for five minutes, rinse and fix in hypo 2 ozs., water 10 ozs., freshly made.

Carbon Red Violet

Water	9 oz.	250 c.c.
Hydrochloric acid	3 m.	8.5 c.c.
Gold chloride	3 gr.	

Print very deeply, wash thoroughly, and tone until desired colour reached. Wash again and fix in hypo 2 ozs., water 10 ozs.

Less acid gives bluish violet. More acid gives red violet-purple.

Toning may be stopped at any stage.

Black Tone

Wash prints in four changes of water before toning and place in

Potass. chloroplatinite	15 grs.	1 gm.
Phosphoric acid (P.B. dil.)	5 drs.	18 c.c.s.
Distilled water	35 ozs.	1000 c.c.s.

When the pictures have assumed the desired black tone they are to be fixed in 5 per cent. hypo for ten minutes, and washed for half an hour in running water. These prints must not be washed (before toning) in the same bath as any other paper, and when removed from the final washing water should be blotted off.

Matt-Albumat.

Gold, Platinum and Gold Platinum Toning

Sodium acetate	22 grs	2 5 gms
Soda carbonate	4½ grs	0 5 gm
Gold chloride	1 gr	0 11 gm
Water	20 ozs	1000 c c s

For platinum black tones, tone for about 30 secs in the above bath wash well and transfer to the following platinum bath

Potass chloroplatinite	15 grs	1 gm
Oxalic acid	150 grs	9 7 gms
Hydrochloric acid	84 minims	5 c c s
Water ..	36 ozs	1000 c c s

in which the prints must be toned until they have quite a ma[illegible] tint by transmitted light Used done, after washing gives range of tones from brown to black Best used fresh

For gold platinum tones, prints are placed in gold bath for one second only quickly washed and placed in platinum bath

For warm black tones, after the first washing immerse the prints one by one in the platinum bath

For red tones, wash very thoroughly after printing and then place the print in a solution of

Common salt	1 oz
Water	20 oz

Wash well and dip for a few seconds only in the platinum bath and then fix as instructed

For brown or sepia tones as above have the prints somewhat

"Agfa" Isolar Lantern Plates.

Rodinal Developer

Rodinal	1 part
Water	30 40 parts

Fix in an acid fixing bath

The fixed picture will usually be found to have a slight coloration, which must be removed by the following operation Thoroughly rinse the plate after fixing, and immerse in soda carbonate 10 per cent solution for five minutes The colour will increase in this bath, but disappear entirely after a further wash and immersion in the acid fixing bath, after which wash as usual and then dry

MISCELLANEOUS INFORMATION.

List of the Principal Works on Photography

[The books mentioned below are obtainable by order of all photographic dealers.]

ELEMENTARY AND GENERAL TEXT-BOOKS.

Elementary Photography By John A Hodges 1s
Ilford Manual of Photography By C H Bothamley, F C S 1s
Barnet Book of Photography 1s 6d
Early Work in Photography By W Ethelbert Henry, C E 1s
Hand Camera Photography By Walter Kilbey 1s
Photography in a Nutshell By the Kernel 1s
The Figures, Facts and Formulæ of Photography ("The Photographic Annual") By H Snowden Ward 1s; cloth, interleaved 2s
Photographic Reference Book By J McIntosh 1s 6d
The Science and Practice of Photography By Chapman Jones 5s
Instruction in Photography. By Sir William Abney 11th Edition Revised and enlarged 7s 6d
Dictionary of Photography By E J Wall 7s 6d
Photography Its History, Processes, Apparatus and Materials By A Brothers 21s
The Book of Photography By Paul N Hasluck 10s 6d
The Complete Photographer By R Child Bayley 10s 6d
Photography in Principle and Practice By S L Bottomley 3s 6d

PHOTOGRAPHIC OPTICS AND CHEMISTRY

Photographic Lenses How to Choose and How to Use By John A Hodges 2s
Photographic Lenses By Conrad Beck and Herbert Andrews 1s
The Lens By Thos Bolas and George E Brown 2s 6d
The Optics of Photography and Photographic Lenses By J Traill Taylor 3s. 6d

System of Applied Optics By H Dennis Taylor 30s
Photographic Optics, a Treatise on By R S Cole 6s
Photographic Optics By Otto Lummer Translated by Silvanus Thompson 6s
First Book of the Lens By C Welborne Piper 2s 6d
Telephotography By T R Dallmeyer 21s
Elementary Telephotography By Ernest Marriage 3s 6d
Lens work for Amateurs By Henry Orford 3s
Tables of Conjugate Foci By J R Gotz 6d
Action of Light in Photography By Sir William Abney 3s 6d
Chemistry of Photographics By Charles F Townsend, F C S 1s
The Chemistry of Photography By R Meldola 6s
Investigations on the Photographic Process By S E Sheppard, D Sc, and C E Kenneth Mees, D Sc 6s 6d

ART, PORTRAITURE, LANDSCAPE AND GENERAL WORK, ETC

Picture making by Photography By H P Robinson 2s 6d
Photography on Tour 6d
Practical Landscape Photography By G T Harris 1
The Photographic Studio A guide to its construction, etc By T Bolas 2s
The Lighting in Photographic Studios By P C Duchochois Revised, with additional matter by W Ethelbert Henry C E 1
Magnesium Light Photography By F J Mortimer 1s
Instantaneous Photography By Sir William Abney 1
Stereoscope and Stereoscopic Photography From the French of F Drouin 2
Photo micrography By E I Spitta 12s
Practical Photo micrography By Andrew Pringle 3s 6d

NEGATIVE PROCESSES

Wet collodion Photography By Charles W Gamble 1s
Collodion Emulsion By H O Klein 5
The Wet Collodion Process By Arthur Payne 3s
Practical Orthochromatic Photography By Arthur Payne 1
The Photography of Coloured Objects By C E Kenneth Mees, D Sc 1s
Negative making By Sir William Abney, F R S 1s
The Watkins Manual of exposure and development By Alfred Watkins 1s
Photography by Rule By J Sterry 1s
Finishing the Negative Edited by H Snowden Ward 1s
Retouching By Arthur Whiting 1s
Art of Retouching By J Hubert 1s
Art of Retouching Negatives, and Finishing and Colouring Photographs By Robert Johnson 2s

PRINTING PROCESSES

Photographic and Photo-mechanical Printing Processes By W K Burton 4s
Art and Practice of Silver Printing By Sir William Abney and Robinson 2s 6d

Bromide Enlarging and Contact Printing By S Herbert Fry 6d
Toning Bromide Prints By R Blake Smith 1s
Toning Bromides By C W Somerville 1s
Photographic Enlargements How to Make Them By Geo Wheeler 1s
ABC Guide to Autotype Permanent Photographs By J R Sawyer, 1s
Carbon Printing By E J Wall 1s
Photo aquatint, or Gum Bichromate Process By Alfred Maskell and R Demachy 1s
Platinotype Printing By A Horsley Hinton 1s
Ferric and Heliographic Processes By George E Brown 2s
Photographic Reproduction Processes By P C Duchochois A treatise on photographic impressions without silver salts 2s 6d
Photo ceramics By W Ethelbert Henry, C E, and H Snowden Ward 1s 6d
The Photographic Picture Postcard By E J Wall and H Snowden Ward 1s

LANTERNS AND LANTERN SLIDES CINEMATOGRAPH

Modern Magic Lanterns By R Child Bayley 1s
The Lantern, and How to Use It By Goodwin Norton
Optical Projection By Lewis Wright 6s
The Optical Lantern its Instruction and Amusement By Andrew Pringle 2s 6d
Lantern Slide Making By Rev F C Lambert 1
Living Pictures By H V Hopwood 2 6d
Animated Photography By Cecil M Hepworth 1s

PHOTO MECHANICAL PROCESSES ETC

Half tone Process, The By Julius Verfasser 5
Half tone Process on the American Basis By Wm C
A Treatise on Photogravure on Intaglio By the Talbot Klic process By Herbert Denison 1 6d
Photo Mechanical Processes By W T Wilkinson 4s
Photo aquatint and Photogravure By Thomas Huson 2
Professional Photography By C H Hewitt Vol I, 1 Vol II, 1s
Photography for the Press By the Editors of *The Photographic Monthly* 1s
Practical Radiography A handbook of the applications of the X-rays By A W Isenthal and H Snowden Ward 6s

COLOUR PHOTOGRAPHY

Photography in Colours By Bolas, Tallent and Senior 1 6d
Three-colour Photography By Baron von Hubl Translated by H O Klein 7s 6d
Natural-colour Photography By Dr E Konig Translated by E J Wall 2s

The Copyright (Works of Art) Act (1862).

An Act for Amending the Law relating to Copyright in Works of the Fine Arts, and for Repressing the Commission of Fraud in the Production and Sale of Such Works.

WHEREAS by law, as now established, the authors of paintings, drawings, and photographs have no copyright in such their works, and it is expedient that the law should in that respect be amended Be it therefore enacted by the Queen's Most Excellent Majesty, by and with the advice and consent of the Lords spiritual and temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

Copyright in Works Hereafter Made or Sold to Vest in the Author for his Life and for Seven Years after his Death.

1 The author, being a *British* subject or resident within the dominions of the Crown, of every original painting, drawing, and photograph which shall be or shall have been made either in the *British* dominions or elsewhere, and which shall not have been sold or disposed of before the commencement of this Act, and his assigns, shall have the sole and exclusive right of copying, engraving, reproducing, and multiplying such painting or drawing, and the design thereof, or such photograph and the negative thereof, by any means and of any size, for the term of the natural life of such author, and seven years after his death provided that when any painting or drawing, or the negative of any photograph, shall for the first time after the passing of this Act be sold or disposed of, or shall be made or executed for or on behalf of any other person for a good or a valuable consideration, the person so selling or disposing of or making or executing the same shall not retain the copyright thereof, unless it be expressly reserved to him by agreement in writing, signed, at or before the time of such sale or disposition, by the vendee or assignee of such painting or drawing, or of such negative of a photograph, or by the person for or on whose behalf the same shall be so made or executed, but the copyright shall belong to the vendee or assignee of such painting or drawing, or of such negative of a photograph, or to the person for or on whose behalf the same shall have been made or executed, nor shall the vendee or assignee thereof be entitled to any such copyright, unless, at or before the time of such sale or disposition, an agreement in writing, signed by the person so selling or disposing of the same, or by his agent duly authorised, shall have been made to that effect

Copyright not to Prevent the Representation of the Same Subjects in Other Works

2 Nothing herein contained shall prejudice the right of any person to copy or use any work in which there shall be no copyright, or to represent any scene or object, notwithstanding that

there may be copyright in some representation of such scene or object

Assignments, Licences, etc., to be in Writing

3 All copyright under this Act shall be deemed personal or moveable estate, and shall be assignable at law, and every assignment thereof, and every licence to use or copy by any means or process the design or work which shall be the subject of such copyright, shall be made by some note or memorandum in writing to be signed by the proprietor of the copyright, or by his agent appointed for that purpose in writing

Register of Proprietors of Copyrights in Paintings, Drawings, and Photographs to be kept at Stationers' Hall, as in 5 and 6 Vict., cap 45

4 There shall be kept at the Hall of the Stationers' Company by the Officer appointed by the said Company for the purposes of the Act passed in the sixth year of Her present Majesty, intituled *An Act to Amend the Law of Copyright*, a book or books, entitled "The Register of Proprietors of Copyright in Paintings, Drawings, and Photographs," wherein shall be entered a memorandum of every copyright to which any person shall be entitled under this Act, and also of every subsequent assignment of any such copyright, and such memorandum shall contain a statement of the date of such agreement or assignment, and of the names of the parties thereto, and of the name and place of abode of the person in whom such copyright shall be vested by virtue thereof, and of the name and place of abode of the author of the work in which there shall be such copyright, together with a short description of the nature and subject of such work and in addition thereto, if the person registering shall so desire, a sketch outline or photograph of the said work, and no proprietor of any such copyright shall be entitled to the benefit of this Act until such registration, and no action shall be sustainable nor any penalty recoverable in respect of anything done before registration

Certain Enactments of 5 and 6 Vict., c. 45, to Apply to the Books to be Kept under this Act

5 The several enactments in the said Act of the sixth year of Her present Majesty contained, with relation to keeping the register book thereby required, and the inspection thereof the searches therein and the delivery of certified and stamped copies thereof, the reception of such copies in evidence, the making of false entries in the said book, and the production in evidence of papers falsely purporting to be copies of entries in the said book the application to the Courts and Judges by persons aggrieved by entries in the said book, and the expunging and varying such entries, shall apply to the book or books to be kept by virtue of this Act and to the entries and assignments of copyright and proprietorship therein under this Act, in such and the same manner as if such enactments were here expressly enacted in relation thereto, save and except that the forms of entry prescribed by the said Act of the sixth year of Her present Majesty

may be varied to meet the circumstances of the case, and that the sum to be demanded by the officer of the said Company of Stationers for making any entry required by this Act shall be one shilling only

Penalties on Infringement of Copyright

6 If the author of any painting, drawing, or photograph in which there shall be subsisting copyright, after having sold or disposed of such copyright, or if any other person, not being the proprietor for the time being of copyright in any painting, drawing, or photograph, shall, without the consent of such proprietor, repeat, copy, colourably imitate, or otherwise multiply for sale, hire, exhibition, or distribution, or cause or procure to be repeated, copied, colourably imitated, or otherwise multiplied for sale, hire, exhibition or distribution, any such work or the design thereof, or, knowing that any such repetition, copy, or other imitation has been unlawfully made, shall import into any part of the United Kingdom, or sell, publish, let to hire, exhibit or distribute, or offer for sale, hire exhibition, or distribution or cause or procure to be imported sold, published, let to hire, distributed or offered for sale, hire exhibition, or distribution, any repetition, copy, or imitation of the said work, or of the design thereof, made without such consent as aforesaid, such person for every such offence shall forfeit to the proprietor of the copyright for the time being a sum not exceeding ten pounds, and all such repetitions copies, and imitations, made without such consent as aforesaid, and all negatives of photographs made for the purpose of obtaining such copies, shall be forfeited to the proprietor of the copyright

Penalties on Fraudulent Productions and Sales

7 No person shall do or cause to be done any or either of the following Acts that is to say,—

First, no person shall fraudulently sign or otherwise affix, or fraudulently cause to be signed or otherwise affixed to or upon any painting, drawing, or photograph, or the negative thereof, any name, initials, or monogram

Secondly, no person shall fraudulently sell, publish, exhibit, or dispose of, or offer for sale, exhibition, or distribution any painting, drawing, or photograph, or negative of photograph, having thereon the name, initials, or monogram, of a person who did not execute or make such work

Thirdly, no person shall fraudulently utter, dispose, or put off, or cause to be uttered or disposed of, any copy or colourable imitation of any painting, drawing, or photograph, or negative of a photograph, whether there shall be subsisting copyright therein or not, as having been made or executed by the author or maker of the original work from which such copy or imitation shall have been taken

Fourthly, where the author or maker of any painting, drawing, or photograph, or negative of a photograph, made either before or after the passing of this Act, shall have sold or otherwise

parted with the possession of such work, if any alteration be afterwards made therein by any other person, by addition or otherwise, no person shall be at liberty, during the life of the author or maker of such work, without his consent, to make or knowingly to sell or publish, or offer for sale, such work or any copies of such work so altered as aforesaid, or of any part thereof, as or for the unaltered work of such author or maker

Penalties

Every offender under this section shall, upon conviction, forfeit to the person aggrieved a sum not exceeding ten pounds, or not exceeding double the full price, if any, at which all such copies, engravings, imitations or altered works shall have been sold or offered for sale, and all such copies, engravings, or imitations, or altered works shall be forfeited to the person, or the assigns, or legal representatives of the person whose name, initials, or monogram shall be so fraudulently signed or affixed thereto, or to whom such spurious or altered work shall be so fraudulently or falsely ascribed as aforesaid Provided always, that the penalties imposed by this section shall not be incurred unless the person whose name, initials, or monogram shall be so fraudulently signed or affixed, or to whom such spurious or altered work shall be so fraudulently or falsely ascribed as aforesaid, shall have been living at or within twenty years next before the time when the offence may have been committed

Recovery of Pecuniary Penalties

8 All pecuniary penalties which shall be incurred, and all such unlawful copies, imitations, and all other effects and things as shall have been forfeited by offenders, pursuant to this Act, and pursuant to any Act for the protection of copyright engravings, may be recovered by the person hereinbefore and in any such Act as aforesaid empowered to recover the same respectively, and hereinafter called the complainant or the complainer, as follows —

In *England* and *Ireland*, either by action against the party offending or by summary proceeding before any two Justices having jurisdiction where the party offending resides

In *Scotland*, by action before the Court of Session in ordinary form, or by summary action before the Sheriff of the County where the offence may be committed or the offender resides, who, upon proof of the offence or offences either by confession of the party offending or by the oath or affirmation of one or more credible witnesses, shall convict the offender, and find him liable to the penalty or penalties aforesaid, as also in expenses, and it shall be lawful for the Sheriff in pronouncing such judgment for the penalty or penalties and costs, to insert in such judgment a warrant, in the event of such penalty or penalties and costs not being paid, to levy and recover the amount of the same by poinding Provided always that it shall be lawful to the Sheriff, in the event of his dismissing the action

and assoilzieing the defender, to find the complainer liable in expenses, and any judgment as to be pronounced by the Sheriff in such summary application shall be final and conclusive, and not subject to review by advocation, suspension, reduction, or otherwise

Superior Courts of Record in which any Action is Pending may Make an Order for an Injunction, Inspection, or Account

9 In any action in any of Her Majesty's Superior Courts of Record at *Westminster* and in *Dublin*, for the infringement of any such copyright as aforesaid, it shall be lawful for the Court in which such action is pending, if the Court be then sitting, or if the Court be not sitting then, for a judge of such Court, on the application of the plaintiff or defendant respectively, to make such order for an injunction, inspection, or account, and to give such direction respecting such action, injunction, inspection, or account, and the proceedings therein respectively, as to such Court or Judge may seem fit.

Importation of Pirated Works Prohibited--Application in such Cases of Customs Act

10 All repetitions, copies, or imitations of paintings, drawings, or photographs, wherein or in the design whereof there shall be subsisting copyright under this Act and all repetitions, copies, and imitations of the design of any such painting or drawing, or of the negative of any such photograph, which, contrary to the provisions of this Act, shall have been made in any Foreign State, or in any part of the *British* dominions, are hereby absolutely prohibited to be imported into any part of the United Kingdom except by or with the consent of the proprietor of the copyright thereof, or his agent authorised in writing, and if the proprietor of any such copyright, or his agent, shall declare that any goods imported are repetitions, copies, or imitations of any such painting, drawing, or photograph or of the negative of any such photograph, and so prohibited as aforesaid, then such goods may be detained by the Officers of Her Majesty's Customs

Saving of Right to Bring Action for Damages

11 If the author of any painting, drawing, or photograph, in which there shall be subsisting copyright, after having sold or otherwise disposed of such copyright, or if any other person, not being the proprietor for the time being of such copyright, shall, without the consent of such proprietor, repeat, copy, colourably imitate, or otherwise multiply, or cause to procure to be repeated, copied, or colourably imitated, or otherwise multiplied for sale, hire, exhibition, or distribution, any such work or the design thereof, or the negative of any such photograph, or shall import or cause to be imported into any part of the United Kingdom, or sell, publish, let to hire, exhibit, or distribute, or offer for sale, hire, exhibition, or distribution, or cause or procure to be sold, published, let to hire, exhibited or distributed, or offered for sale, hire, exhibition, or dis-

tribution, any repetition, copy, or imitation of such work, or the design thereof, or the negative of any such photograph, made without such consent as aforesaid, then every such proprietor, in addition to the remedies hereby given for the recovery of any such penalties, and forfeiture of any such things as aforesaid, may recover damages by and in a special action on the case, to be brought against the person so offending, and may in such action recover and enforce the delivery to him of all unlawful repetitions, copies, and imitations and negatives of photographs, or may recover damages for the retention or conversion thereof Provided that nothing herein contained, nor any proceeding, conviction, or judgment, for any act hereby forbidden, shall effect any remedy which any person aggrieved by such Act may be entitled to either at law or in equity

Provisions of 7 and 8 Vict., c 12, to be Considered as Included in this Act

12 This Act shall be considered as including the provisions of the Act passed in the Session of Parliament held in the seventh and eighth years of her Present Majesty, intituled *An Act to Amend the Law relating to International Copyright*, in the same manner as if such provisions were part of this Act

Reproduction Fees

The Copyright Union has drawn attention to the following suggestions, drawn up for the guidance of its members by Mr Alfred Ellis —

Members are advised not to give permission for their copyright photographs to be reproduced until they have full particulars of the size and style of the proposed reproduction, when they can formulate their charges accordingly For example a newspaper should pay a fee of not less than 10s 6d for half tone black and white reproduction not exceeding 6 by 4 inches, when printed with letterpress in one issue of a newspaper, but, if it is to be printed as an inset, the fee should be at least one guinea If printed in colours, collotype or photogravure, it should be a still higher fee If a photograph is to be reproduced for advertising purposes, a higher fee should be charged than for newspaper work In all cases the permission must be in writing, and should state the fee to be paid, the process by which the photograph is to be reproduced, and whether in black-and white or colours, the size limit, and the purpose for which the reproduction may be used

The fee for reproduction on postcards should be not less than 10s 6d royalty per thousand for half tone or collotype, and £1 1s per thousand for bromide or ordinary photographic processes

TABLES.

WEIGHTS AND MEASURES.

The formulæ in the editorial pages of the Almanac are given, in almost all cases, in both British and metric measures; and in adopting this course we have had the desire to impress upon photographers the simplicity and facility of the latter system. As a rule, the British formulæ are expressed in grains per ounce or per 20 oz. of solution, and the metric formulæ in grammes per 1000 c.c. In regard to the total bulk of solution, our formulæ are mostly drawn up on the basis that the total bulk after the solution of the solids is that stated in the formula, 20 ozs. or 1000 c.c.s, as a rule.

The question of a 10 per cent. solution is a point in formulæ making and using which has caused endless discussion, but it is really simple enough if it be borne in mind that the ounce avoirdupois contains 437½ grains, while the fluid ounce contains 480 minims. As 10 per cent. solutions, being strong, are usually measured out in minims, the ounce avoirdupois must be dissolved in enough water to make a solution containing 1 grain in 10 minims; that is to say, 4375 minims, or practically 9 ounces, is the proper bulk for the solution of 1 ounce avoirdupois. But if a solution is to be measured out in fluid ounces, then the 10 per cent. solution will be 1 oz. in 10 fluid ozs.

Throughout this work "grains per ounce" are converted into "grammes per litre" by multiplying by 2.3. Ounces per any given number of fluid ounces are converted by taking the same ratio of grammes to 1000 c.c.s.

In reference to the names of chemicals, "sodium carbonate" and "sodium sulphite" are used for the crystallised forms of these substances. If the "dry" or "anhydrous" forms are meant, one or other of these terms is used in qualification.

British Weights and Measures.

1. APOTHECARIES' WEIGHT.*

20 Grains	= 1 Scruple	
3 Scruples	= 1 Drachm	= 60 Grains
8 Drachms	= 1 Ounce	= 480 Grains

2. AVOIRDUPOIS WEIGHT.*

437½ Grains	= 1 Ounce	
16 Ounces	= 1 Pound	= 7000 Grains

¼ ounce = 109 grains. ½ ounce = 219 grains. ¾ ounce = 328 grains.

3. FLUID MEASURE.

60 Minims	= 1 Drachm		
8 Drachms	= 1 Ounce	= 480 Minims	
20 Ounces	= 1 Pint	= 160 Drachms	= 9600 Minims
2 Pints	= 1 Quart	= 40 Ounces	= 320 Drachms
4 Quarts	= 1 Gallon	= 160 Ounces	= 1280 Drachms

1 fluid ounce of water weighs 437½ grains, therefore every minim weighs 0.91 grain.

Metric Weights and Measures.

The unit of weight is the gramme, written "gm."; the subdivisions are the "deci-" (1/10th), "centi-" (1/100th), and "milli-gramme" (1/1000th); the multiples are the "deka-" (10 gm.) and "hectogramme" (100 gm.), but in practice it is usual to use the terms 0.1 or 0.01 and 10 or 100 grammes, and the abbreviation "kilo" for 1000 gm.

The following are the equivalents of Metric Weights and Measures in terms of Imperial Weights and Measures.

LINEAR MEASURE.

1 Millimetre (mm.) (1/1000th M.)	0.03937 inch
1 Centimetre (1/100th M.)	0.3937 "
1 Metre (M.)	39.370113 inches 3.280843 feet 1.0936143 yards
1 Kilometre (1000 M.)	0.62137 mile

SQUARE MEASURE.

1 Square Centimetre	0.155 square inch
1 Square Metre (100 square decimetres)	10.7639 square feet 1.196 square yards

WEIGHT. *Avoirdupois.*

1 Milligramme (1/1000th gm.)	0.015 grain
1 Gramme (1 gm.)	15.432 "
1 Kilogramme (1000 gm.)	2.2046223 lbs. or 35.273957 ozs.

* It is now customary in formulæ to employ the avoirdupois ounce (437½ grains), but in cases where "drachms" are given the apothecaries' drachm of 60 grains is taken as the unit.

FLUID MEASURE

1 Cubic centimetre* (c.c.) (1 1000th litre) = 16.9 minims.
1 Litre (1 l.) = 35 ozs. 94 m. = 16894.1 minims.

Conversion of Metric into British Measures

GMS. PER LITRE INTO GRAINS PER 10* OZS.

The following table gives the most convenient means of translating metric formulæ into British measures.

* The figures given in Columns 2, 4, and 6 are a correct translation of the metric proportion when the solution is measured out in ounces and fractions of an ounce. If to be measured in minims, the quantities in Columns 2, 4, and 6 are dissolved in 9 ozs. 2 drs. of water.

1	2	3	4			5	6		
Gms. Per Litre	Grs. Per 10* ozs.	Gms. Per Litre	Grs.	Ozs.	Grs.	Gms. Per Litre	Grs.	Oz.	Grs.
			Per 10* ozs.				Per 10* ozs.		
1	4.4	30	131	¼	22	155	678	1½	22
2	8.8	35	153	¼	44	160	700	1½	44
3	13.1	40	175	¼	66	165	722	1½	66
4	17.5	45	197	¼	88	170	744	1½	88
5	21.9	50	219	½	0	175	766	1¾	0
6	26.3	55	241	½	22	180	788	1¾	22
7	30.6	60	263	½	43	185	809	1¾	43
8	35.0	65	284	½	65	190	831	1¾	65
9	39.4	70	306	½	87	195	853	1¾	87
10	43.8	75	328	¾	0	200	875	2	
11	48.1	80	350	¾	22	225	984	2¼	
12	52.5	85	371	¾	43	250	1,094	2½	
13	56.9	90	393	¾	65	275	1,203	2¾	
14	61.2	95	415	¾	87	300	1,312	3	
15	65.6	100	437	1	0	325	1,422	3¼	
16	70.0	105	459	1	22	350	1,531	3½	
17	74.4	110	481	1	44	375	1,641	3¾	
18	78.8	115	503	1	66	400	1,750	4	
19	83.1	120	525	1	88	425	1,859	4¼	
20	87.5	125	547	1¼	0	450	1,969	4½	
21	91.9	130	569	1¼	22	475	2,078	4¾	
22	96.2	135	591	1¼	44	500	2,187	5	
23	100.6	140	613	1¼	66				
24	105.0	145	631	1¼	87				
25	109.4	150	656	1½	0				

* N.B.—Quantities in Columns 2, 4, and 6 are dissolved in 9 ozs. 2 drs. when solutions are to be measured out in minims.

* *Millilitre and C.C.*—Revisions of metric standards have shown that the litre is not exactly 1000 c.c.s., but 999.84 c.c.s. (according to Mendeléeff's calculations from the experimental data). The difference appears sufficiently serious in official circles to warrant the abandonment of the term "cubic centimetre," and the employment of "millilitre" for the true thousandth part, millilitre to be abbreviated to "mil." On grounds of terminology there is some reason for this, but until "millilitre" commences to oust c.c. from current writings we shall continue to use the latter term. As regards error, the difference is absolutely negligible, not more than 4 drops in 35 ozs.

GRAMMES INTO GRAINS AND OUNCES (AVOIRDUPOIS)

Gms	Ozs	Grs	Gms	Ozs	Grs	Gms	Ozs	Grs
0.1		1.5	16	½	28.1	130	4½	37
0.2		3.1	17	½	43.5	140	4¾	82
0.3		4.6	18	½	59.0	150	5¼	118
0.4		6.2	19	½	71.4	160	5½	61
0.5		7.7	20	½	89.8	170	6	0
0.6		9.1	25	¾	57.0	175	6	76
0.7		10.8	30	1	25	180	6¼	41
0.8		12.4	35	1	103	190	6½	88
0.9		13.9	40	1¼	71	200	7	24
1		15.43	45	1½	38	250	8¾	32
2		30.9	50	1¾	6	300	10½	31
3		46.3	55	1¾	83	350	12¼	41
4		61.7	60	2	51	400	14	50
5		77.2	65	2¼	19	450	15¾	52
6		92.6	70	2¼	94	500	17½	61
7		108.0	75	2½	64	550	19¼	66
8	¼	14.1	80	2¾	32	600	21	70
9	¼	29.5	85	3	0	650	22¾	73
10	¼	44.9	90	3	76	700	24½	81
11	¼	60.4	95	3¼	44	750	26¼	91
12	¼	75.8	100	3½	11	800	28	95
13	¼	91.2	110	3¾	56	850	29¾	102
14	¼	106.7	120	4	102	900	31½	106
15	¼	122.7	125	4¼	70	1000	35¼	11

Note —In the above table the British equivalents are given in the form most convenient for actual work, viz, in even ounces and quarter ounces, with odd grains over. If calculations need to be made, the following figures giving the equivalent of ounces and quarter-ounces in grains will be found useful —

¼ oz	109 grs	1¾ oz	765 grs	1,421 grs	2,078 grs
½ oz	219 grs	2 ozs	875 grs	1,531 grs	2,296 grs
¾ oz	328 grs	2¼ ozs	984 grs	1,640 grs	2,406 grs
1 oz	437 grs	2½ ozs	1,094 grs	1,750 grs	2,625 grs
1¼ oz	546 grs	2¾ ozs	1,203 grs 4¼	1,859 grs	2,734 grs
1½ oz	656 grs	3 ozs	1,312 grs	1,969 grs	2,844 grs

C.C.S INTO MINIMS AND OUNCES (FLUID)

C.c.s	Ozs	Mins	C.c.s	Ozs	Mins	C.c.s	Ozs	Mins
1		16.9	6		101.4	11	¼	66
2		33.8	7		118.3	12	¼	83
3		50.7	8		15.2	13	¼	100
4		67.6	9		32	14	¼	117
5		84.5	10		49	15	½	13

C.C.S INTO MINIMS AND OUNCES (FLUID) *Continued*

C.c.s	Ozs	Min	C.c.s	Ozs	Mins	C.c.s	Ozs	Min
16	½	30	120	4	107	500	17½	47
17	½	47	125	4¼	72	525	18¼	110
18	½	64	130	4½	36	550	19¼	52
19	½	81	140	4¾	85	575	20	114
20	½	98	150	5¼	14	600	21	56
25	[illegible]	82	160	5½	63	625	22	0
30	1	27	170	5¾	112	650	22¾	61
35	1	111	175	6	76	675	23¼	4
40	1¼	76	180	6¼	41	700	24¼	66
45	1½	10	190	6½	90	725	25½	8
50	1¾	5	200	7	20	750	26½	70
55	1¾	89	225	7¾	81	775	27¼	15
60	2	54	250	8½	24	800	28	75
65	2¼	18	275	9½	86	825	29	18
70	2¼	103	300	10½	28	850	29¾	80
75	2½	67	325	11¼	90	875	30½	22
80	2¾	32	350	12¼	33	900	31½	65
85	2¾	116	375	13	95	925	32¼	[illegible]
90	3	81	400	14	[illegible]	950	33¼	90
95	3¼	45	425	14¾	100	975	34¼	32
100	3½	10	450	15½	42	1000	35	91
110	3¾	58	475	16½	105			

Conversion of British into Metric Measures.

GRAINS INTO GRAMMES

Grs	Gms	Grs	Gms	Grs	Gms
1	0 065	16	1 037	35	2 268
2	0 13	17	1 102	40	2 592
3	0 194	18	1 166	45	2 916
4	0 259	19	1 232	50	3 240
5	0 324	20	1 296	55	3 564
6	0 389	21	1 361	60	3 888
7	0 454	22	1 426	65	4 212
8	0 518	23	1 490	70	4 536
9	0 583	24	1 555	75	4 860
10	0 648	25	1 620	80	5 184
11	0 713	26	1 685	85	5 508
12	0 778	27	1 750	90	5 832
13	0 842	28	1 814	95	6 156
14	0 907	29	1 880	100	6 480
15	0 972	30	1 944		

OUNCES (AVOIRDUPOIS) TO GRAMMES

Ozs	Gms	Ozs	Gms	Ozs	Gms
¼	7.09	4	113.40	13	368.54
½	14.17	5	141.75	14	396.89
¾	21.26	6	170.10	15	425.24
1	28.35	7	198.45	16	453.59
1½	42.5	8	226.80	17	481.94
2	56.70	9	255.15	18	510.29
2½	70.87	11	311.8	19	538.64
3	85.05	12	340.19	20	566.99

FLUID OUNCES AND DRACHMS TO C.C.S

Minims	C.c.	Drs	C.c.s	Oz.	C.c.s	Ozs	C.c.s
5	.3	½	1.78	1½	42.6	11	312.5
10	.6	1	3.55	2	56.8	12	341.0
15	.9	2	7.10	3	85.2	13	369.3
20	1.2	3	10.65	4	113.6	14	398.0
25	1.5	4	14.20	5	142.0	15	426.0
		5	17.75	6	170.5	16	454.5
		6	21.30	7	198.9	17	483.0
		7	24.86	8	227.3	18	511.5
		8	28.41	9	255.7	19	540.0
				10	284.0	20	568.0

CONVERSION RULES

Grammes per litre into grains per ounce.—Multiply the grammes by 0.44.

C.c.s per litre into minims per ounce.—Divide the c.c.s by 2 (more exactly, multiply by 0.48).

Grains per ounce into grammes per litre.—Multiply the grains by 2.3. Thus 50 grs. per oz. = 115 gms. per litre.

Minims per ounce into c.c.s per litre.—Multiply the minims by 2

COINS AS WEIGHTS

Silver coinage, it is useful to note, is minted exactly by weight in proportion to its value, viz., 436 4/11 grains for every 5s. Thus the threepenny bit is 21.8 grs.; a sixpence, 43.6; shilling, 87.2; florin, 175.4; half-crown, 218 grs.

Thus the sixpence and threepenny piece are almost exactly one tenth and one twentieth of the avoirdupois ounce.

Bronze coinage. Three pennies, or five halfpennies, or ten farthings = 1 oz. (avoirdupois).

i.e., the penny = 145.8 grs.; 1 halfpenny, 87.5; and 1 farthing, 43.75 grs.

One sovereign weighs 123.27 grs.; the half-sovereign, 61.63 grs.

¼ oz.	(avoir.)	one halfpenny and one threepenny piece
½ „	„	two halfpennies and a farthing
1 „	„	three pennies (or five halfpennies)
2 „	„	six pennies (or ten halfpennies)
4 „	„	twelve pennies (or twenty halfpennies)

FRENCH COINS AS METRIC WEIGHTS

Lord Crawford gives the following table:—

Silver Coins		*Bronze Coins*	
25 grms.	5 francs	10 grms.	10 centimes
10 „	2 „	5 „	
5 „	1 „	2 „	
2½ „	½ „ or 50 centimes	1 „	

PARTS

Formulæ given, as many are, in "parts" may be made up by writing grms. for the solid and c.c.s for the fluid "parts," and converting them into the British measures by any of the tables in this section. Thus: Adurol, 10 parts; sodium sulphite, 100 parts; water 1000 parts becomes adurol, 154 grs.; sodium sulphite, 3 ozs. 230 grs.; water, 35 ozs.

'F.

INCHES INTO MILLIMETRES				MILLIMETRES INTO INCHES			
Inches	Millimetres.	Inches.	Millimetres	Millimetres	Inches	Millimetres	Inches.
1	25·4	3/8	9·5	0·1	0·0039	13	0·51
15/16	23·8	11/32	8·7	0·5	0·015	14	0·55
[illegible]	23·	5/16	7·9	1	0·04	15	0·59
7/8	22·2	9/32	7·1	2	0·08	16	0·63
				3	0·12	17	0·67
13/16	20·6	1/4	6·4	4	0·16	18	0·71
3/4	19·1	7/32	5·6	5	0·20	19	0·75
11/16	17·5	3/16	4·8	6	0·24	20	0·79
				7	0·28	21	0·83
5/8	15·9	1/8	3·2	8	0·31	22	0·87
9/16	14·3	3/32	2·4	9	0·35	23	0·90
1/2	12·7	1/16	1·6	10	0·39	24	0·94
7/16	11·1	1/32	0·8	11	0·43	25	0·98
				12	0·47	25·4	1·0

ENGLISH SIZES OF PLATES

Inches		Cm		Inches		Cm	
3½	2½	8·9	6·4	7 ×	5	17·8	12·7
3¼	3¼*	8·25	8·25	8½	6½¶	21·5	16·5
4¼	3¼†	10·8 ×	8·25	10	8	25·4	20·3
5	4	12·6	10·1	12	10	30·4	25·4
6½	4¾§	16·5 ×	12·0	15	12	38·1	30·4

* Lantern plate † Quarter plate ‡ Smallest common size in America § Half-plate ‖ Usual medium size in America ¶ Whole plate

CONTINENTAL SIZES OF PLATES IN COMMON USE

Cm		Inches		Cm		Inches	
9	12*	3·54	4·72	18	24	7·08	9·44
12	16	4·72	6·30	24	30	9·44	11·81
13 ×	18†	5·12	7·08	30	40	11·81	15·75
13 ×	21	5·12 ×	8·25	40	50	15·75	19·69

* The standard small size, equivalent to the British quarter plate
† The standard medium size (British half plate)

FOREIGN LANTERN SLIDES

The standard French size for lantern slides is 10 by 8 cm, though many makers prepare slides 3¼ by 3¼ The American size is 4 by 3¼, though some makers use the English quarter-plate (4¼ by 3¼)

CHEMICAL TABLES.

TABLE OF SYMBOLS AND EQUIVALENT WEIGHTS OF THE MORE IMPORTANT COMPOUNDS USED IN PHOTOGRAPHY

The atomic weights of the elements employed in working out the equivalent weights given below are the round numbers contained in the first column of the Table of Atomic Weights on page 842.

Name	Symbol	Equiv. Weight
Acetone	C_3H_6O	58
,, sulphite	$C_3H_6(OH)SO_3Na$	162
Acid, acetic	$C_2H_4O_2$	60
,, benzoic	C_6H_5COOH	122
,, boric	H_3BO_3	62
,, carbolic	C_6H_5OH	94
,, chlorochromic	$Cl\,CrO_2\,OH$	136.5
,, chromic (anhydride)	CrO_3	100
,, citric	$C_6H_8O_7\,H_2O$	210
,, dithionic	$H_2S_2O_6$	162
,, formic	H_2CO_2	46
,, gallic	$C_6H_2(OH)_3COOH\,H_2O$	188
,, hydrobromic	HBr	81
,, hydrochloric	HCl	36.5
,, hydrofluoric	HF	34
,, lactic	$CH_3CH(OH)COOH$	90
,, nitric	HNO_3	63
,, oxalic	$H_2C_2O_4$	126
,, pentathionic	$H_2S_5O_6$	258
,, perchromic	$HCrO_4$	117
,, phosphoric	H_3PO_4	98
,, picric	$C_6H_2(NO_2)_3OH$	229
,, pyrogallic	$C_6H_3(OH)_3$	126
,, salicylic	$C_6H_4(OH)COOH$	138
,, sulphuric	H_2SO_4	98
,, sulphurous	H_2SO_3	82
,, tannic	$C_{14}H_{10}O_9$	322
,, tartaric	$C_2H_2(OH)_2(COOH)_2$	150
,, tetrathionic	$H_2S_4O_6$	226
,, trithionic	$H_2S_3O_6$	194
Adurol*	$C_6H_3(OH)_2Cl$ (or Br)	–
Alcohol (methyl)	CH_3OH	32
,, (ethyl)	C_2H_5OH	46

* Adurol is mono chlor (or mono brom) hydroquinone

TABLES OF SYMBOLS, ETC.—CONTINUED

NAME	SYMBOL	EQUIV. WEIGHT
Alum, ammonia	$Al_2(NH_4)_2(SO_4)_4\,24H_2O$	906
,, chrome	$Cr_2K_2(SO_4)_4\,24H_2O$	998
,, iron ammonia	$Fe_2(NH_4)_2(SO_4)_4\,24H_2O$	964
,, potash	$Al_2K_2(SO_4)_4\,24H_2O$	948
Aluminium chloride	$Al_2Cl_6\,12H_2O$	267
,, sulphate	$Al_2(SO_4)_3\,16H_2O$	634
,, sulphocyanide	$Al_2(CNS)_6$	402
Amidol	$C_6H_3OH\,NH_2\,HCl$	144.5
Ammonia	NH_3	17
Ammonium bichromate	$(NH_4)_2Cr_2O_7$	252
,, bromide	NH_4Br	98
,, carbonate	$NH_4HCO_3 + NH_2COONH_4$	
,, chloride	NH_4Cl	53.5
,, chromate	$(NH_4)_2CrO_4$	152
,, citrate	$(NH_4)_2C_6H_6O_7$	226
,, iodide	NH_4I	145
,, molybdate	$(NH_4)_6Mo_7O_{24}\,4H_2O$	1236
,, nitrate	NH_4NO_3	80
,, oxalate	$(NH_4)_2C_2O_4\,H_2O$	142
,, persulphate	$(NH_4)_2S_2O_8$	228
,, phosphate	$(NH_4)_2HPO_4$	132
,, sulphate	$(NH_4)_2SO_4$	132
,, sulphide	NH_4HS	51
,, sulphocyanide	NH_4CNS	76
,, vanadate	NH_4VO_3	117
Amyl, acetate	$C_7H_{14}O_2$	130
,, alcohol	$(CH_3)_2CHCH_2CH_2OH$	88
Aniline	$C_6H_5NH_2$	93
"Anthion" (potass. persulphate)		
Antimony, sulphide	Sb_2S_3	336
Aurantia	$(C_6H_2(NO_2)_3)_2N\,NH_4$	456
Aurine	$C(C_6H_4OH)_2C_6H_4O$	290
Barium, bromide	$BaBr_2\,2H_2O$	333
,, chloride	$BaCl_2\,2H_2O$	244
,, iodide	BaI_2	391
,, nitrate	$Ba(NO_3)_2$	261
,, peroxide	BaO_2	201
,, sulphate	$BaSO_4$	233
Benzole (benzene)	C_6H_6	78
Borax (see Sodium borate)		
Bromine	Br	80
Cadmium, bromide	$CdBr_2\,4H_2O$	344
,, chloride	$CdCl_2$	183
,, iodide	CdI_2	366
Calcium, carbide	CaC_2	64
,, carbonate	$CaCO_3$	100
,, chloride (cryst.)	$CaCl_2\,6H_2O$	219

TABLE OF SYMBOLS, &c.—Continued

Name	Symbol	Equiv. Weight
Calcium, chloride (fused)	$Ca\,Cl_2$	111
" hypochlorite	$Ca\,(OCl)_2$	153
" sulphate	$Ca\,SO_4\,2H_2O$	172
" hydroxide (slaked lime)	$Ca\,(OH)_2$	74
Carbon, bisulphide	$C\,S_2$	76
Colloidin	$C_{12}\,H_{16}\,O_6\,(NO_3)_4$	504
Ceric, sulphate	$Ce\,(SO_4)_2\,4H_2O$	404
Chloral hydrate	$C\,Cl_3\,CH\,(OH)_2$	165 5
Chloroform	$CH\,Cl_3$	119 5
Chrysoidine	$C_6\,H_5\,N_2\,C_6\,H_3\,(NH_2)_2$	211 7
Cobalt, chloride	$Co\,Cl_2\,6H_2O$	238
Copper, bromide	$Cu\,Br_2$	223 5
" chloride	$Cu\,Cl_2\,2H_2O$	170 5
" nitrate	$Cu\,(NO_3)_2\,6H_2O$	357 5
" sulphate	$Cu\,SO_4\,5H_2O$	249 5
Cyanine	$C\,,H_{..}\,N_2\,I$	541
Dextrine	$(C_6\,H_{10}\,O_5)\,x$	
Diamidophenol	$C_6\,H_3\,OH\,(NH_2)_2$	124
Edinol*		
Eikonogen†	$C_{10}\,H_5\,(OH)\,NH_2\,SO_3\,O\,Na$	263
Eosine	Na or K Salt of $C_6H_4(CO)_2O(C_6H\,OH\,X_2)_2$‡	-
Erythrosine	$C_6\,H_4\,(CO)_2\,O\,(C_6\,H\,OH\,X_2)_2$	
Ether	$C_4\,H_{10}\,O$	74
Ferrous and ferric salts (See Iron)		
Formaline	40 % sol. of CH_2O	
Glycerine	$C_3\,H_5\,(OH)_3$	92
Glycin§	$C_6\,H_4\,OH\,NHCH_2\,COOH$	167
Gold, chloride yellow	$H\,Au\,Cl_4\,4H_2O$	412
" " brown	$H\,Au\,Cl_4$	340
" " potassium	$K\,Au\,Cl_4\,2H_2O$	414
" " sodium	$Na\,Au\,Cl_4\,2H_2O$	398
Hydrogen, peroxide	H_2O_2	34
Hydroquinone	$C_6\,H_4\,(OH)_2$	110
Iodine	I	127
Iridious chloride	$Ir\,Cl$	299 5
" tetrachloride	$Ir\,Cl_4$	335
" potassium	$K_2\,Ir\,Cl\,Cl_4$	184
" sodium "	$Na_2\,Ir\,Cl_6$	452
Ferric chloride (dry)	$Fe_2\,Cl_6$	325

* Edinol is the hydrochloride of m-amido-o-oxy-benzyl alcohol.

† Eikonogen is the sodium salt of amido-β-naphthol-β-monosulphonic acid.

‡ The X in these formulæ may be bromine, iodine, or chlorine, which in other proportions constitute the various commercial dyes.

§ Glycin is p-oxyphenyl glycin or p-oxyphenyl amido acetic acid.

TABLES OF SYMBOLS, &c.—CONTINUED

NAME	SYMBOL	EQUIV. WEIGHT
Ferric chloride (lump)	$Fe_2Cl_6\,12H_2O$	541
" ammonia citrate, brown	$4\,Fe\,C_6H_5O_7\,3\,(NH_4)_3C_6H_5O_7\,3\,Fe(OH)_3$	2050
	$5\,FeC_6H_5O_7\,2(NH_4)_3C_6H_5O_7\,NH_4C_6H_7O_7\,2H_2O$	1956
" oxalate	$Fe_2(C_2O_4)_3$	376
" ammonium oxalate	$(NH_4)_6Fe_2(C_2O_4)_6\,3H_2O$	1?8
" potassium "	$K_6Fe_2(C_2O_4)_6\,3H_2O$	491
" sodium "	$Na_6Fe_2(C_2O_4)_6\,11H_2O$	976
Ferrous, chloride (dry)	$FeCl_2$	127
" " (cryst.)	$FeCl_2\,4H_2O$	199
" oxalate	$FeC_2O_4\,2H_2O$	180
" potassium oxalate	$K_2Fe(C_2O_4)_2H_2O$	3?8
" sulphate	$FeSO_4\,7H_2O$	278
" ammonia sulphate	$Fe(NH_4)_2(SO_4)_2\,6H_2O$	392
Lead acetate	$Pb(C_2H_3O_2)_2\,3H_2O$	379
" nitrate	$Pb(NO_3)_2$	331
Lithia, caustic	$LiOH$	24
Lithium, bromide	$LiBr$	87
" carbonate	Li_2CO_3	74
Lithium, chloride	$LiCl$ (cryst. has $2H_2O$)	42·5
" iodide	LiI	134
Magnesium, chloride	$MgCl_2$	
" sulphate	$MgSO_4\,7H_2O$	
Manganese, peroxide	MnO_2	87
" sulphate	$MnSO_4\,4H_2O$	223
Mercury	Hg	200
" bichloride	$HgCl_2$	271
" iodide	HgI_2	454
" potass. iodide (sol.)	$HgI_2\,2KI$	786
Metol*	$(C_6H_4OH\,NHCH_3\,p)_2\,H_2SO_4$	344
Ortol†	$(C_6H_4OH\,NHCH_3\,o)_2\,H_2SO_4\,C_6H_4(OH)_2p$	
Palladious chloride	$PdCl_2$	177
" potassium chloride	K_2PdCl_4	326
Para-amidophenol	$C_6H_4\,NH_2\,OH$	109
Phenol (see Acid carbolic)		
Platinum per (or bi)chloride	$H_2PtCl_6\,6H_2O$	516
Potassium, ammonium chromate	KNH_4CrO_4	173
" bicarbonate	$KHCO_3$	100
" bichromate	$K_2Cr_2O_7$	294
" boro tartrate	$C_4H_2(OH)_2(CO_2)_2BOK$	214
" bromide	KBr	119
" carbonate (dry)	K_2CO_3	138

* Metol is the sulphate of mono methyl para amido phenol.
† Ortol is a mixture of one molecule each of methyl ortho amido phenol and hydroquinone.

TABLES OF SYMBOLS, &c.—Continued.

Name		Symbol	Weight
Potassium	chlorate	$KClO_3$	122 5
,,	chloride	KCl	74 5
,,	chloro-platinite	K_2PtCl_4	415 4
,,	chromate	K_2CrO_4	194
,,	citrate	$K_3C_6H_5O_7,H_2O$	[illegible]
,,	cyanide	KCN	65
,,	ferricyanide	$K_3Fe(CN)_6$	[illegible]
,,	ferrocyanide	$K_4Fe(CN)_6,3H_2O$	[illegible]
,,	hydrate	KHO	56
,,	iodide	KI	166
,,	metabisulphite	$K_2S_2O_5$	222
,,	nitrate	KNO_3	101
,,	nitrite	KNO_2	85
,,	oxalate	$K_2C_2O_4,H_2O$	184
,,	percarbonate	$K_2C_2O_6$	198
,,	perchlorate	$KClO_4$	138 5
,,	permanganate	$KMnO_4$	316
,,	persulphate	$K_2S_2O_8$	270
,,	sulphate	K_2SO_4	174
,,	sulphocyanide	$KCNS$	97
Pyrocatechin		$C_6H_4(OH)_2$	110
Rochelle salt		[illegible]	[illegible]
Schlippe's salt (sodium sulphantimoniate)		$Na_3SbS_4,9H_2O$	[illegible]
Silver, acetate		$AgC_2H_3O_2$	167
,,	ammonium nitrate	[illegible]	204
,,	bromide	$AgBr$	188
,,	carbonate	Ag_2CO_3	276
,,	chloride	$AgCl$	143 5
,,	citrate	$Ag_3C_6H_5O_7$	513
,,	fluoride	AgF,H_2O	199
,,	iodide	AgI	235
,,	nitrate	$AgNO_3$	170
,,	nitrite	$AgNO_2$	154
,,	oxalate	$Ag_2C_2O_4$	304
,,	oxide	Ag_2O	232
,,	phosphate	Ag_3PO_4	419
,,	sulphate	Ag_2SO_4	312
,,	sulphide	Ag_2S	248
,,	tartrate	$Ag_2C_4H_4O_6$	363 1
Sodium, acetate		$NaC_2H_3O_2,3H_2O$	136
,,	,, (fused)	$NaC_2H_3O_2$	102
,,	bicarbonate	$NaHCO_3$	84
,,	bichromate	$Na_2Cr_2O_7,2H_2O$	298
,,	bisulphite	$NaHSO_3$	104

TABLES OF SYMBOLS, &c.—CONTINUED

NAME	SYMBOL	EQUIV. WEIGHT
Sodium, borate	$Na_2B_4O_7\,10H_2O$	382
" bromide	$NaBr\,2H_2O$	139
" carbonate (dry)	Na_2CO_3	106
" carbonate (cryst.)	$Na_2CO_3\,10H_2O$	286
" chloride	$NaCl$	58.5
" chloro platinate	$Na_2PtCl_6\,6H_2O$	560.4
" citrate	$Na_3C_6H_5O_7\,5\frac{1}{2}H_2O$	357
" fluoride	NaF	42
" hydrate (caustic)	$NaOH$	40
" hydrosulphite*	$NaHSO_2$	88
" hyposulphite†	$Na_2S_2O_3\,5H_2O$	248
" iodide	NaI	150
" nitrate	$NaNO_3$	85
" nitroprusside	$Na_4Fe_2(CN)_{10}(NO)_2\,4H_2O$	600
" oxalate	$Na_2C_2O_4$	134
" phosphate	$Na_2HPO_4\,12H_2O$	358
" tribasic phosphate	$Na_3PO_4\,12H_2O$	380
" sulphate (cryst.)	$Na_2SO_4\,10H_2O$	322
" sulphide	$Na_2S\,9H_2O$	240
" sulphite (dry)	Na_2SO_3	126
" " (cryst.)		
" tungstate	$Na_{10}W_{12}O_{41}\,28H_2O$	379.8
Strontium bromide	$SrBr_2$	247.5
" chloride (dry)	$SrCl_2$	158.5
" " (cryst.)	$SrCl_2\,2H_2O$	194.5
" iodide	SrI_2	341.5
" nitrate	$Sr(NO_3)_2$	211.5
Thiocarbamide	$CS(NH_2)_2$	76
Thiosinamine	$CS(NH_2)NHC_3H_5$	116
Thymol	$C_6H_3(CH_3)(OH)C_3H_7$	150
Tin (Stannous) chloride	$SnCl_2\,2H_2O$	225
Uranium acetate	$UO_2(C_2H_3O_2)_2\,2H_2O$	426
" chloride	UO_2Cl_2	341
" nitrate	$UO_2(NO_3)_2\,6H_2O$	504
Zinc sulphate	$ZnSO_4\,7H_2O$	287

* Called "hyposulphite" by chemists. † Called "thiosulphate" by chemists.

TABLE OF THE SOLUBILITIES OF THE PRINCIPAL SUBSTANCES USED IN PHOTOGRAPHY

sol. = *soluble*; v.s. = *very soluble*; s.s. = *slightly soluble*; dec. = *decomposed*; insol. = *insoluble*.

Name	One part is soluble in ... parts of water: Cold	Boiling	[illegible]	Solubility in Alcohol, &c.
Acetone				
„ sulphite	v.s.			
Acid, acetic				
„ benzoic	380	45	0.?7	1 in 2.75 90%,
„ boric	29	?9	?4	1 in ?8 90%,
„ carbolic	15		6.6	v.s.
„ chromic (anhydride)	0.6	v.s.	160	sol. with decomp.
„ citric	[illegible]	1	1.0	
„ formic				
„ gallic	100	0.3	1	1 in 5 90% alcohol, 1 in 10 ether

Acetone (sp. gr. 0.814) boils at 1?? F., miscible in all proportions with water, alcohol and ether. ?? grm. dissolve in 100 ?ms. 20?, forming a solution at 60° F. A solvent of resin, fats, camphor, pyroxylin and celluloid.

Acetic Acid.—The "glacial" acid, which is that implied in formulae unless a weaker acid is directed, solidifies about 40°. Its sp. gr. is 1.0??; it boils at 245° F. It is a solvent of gelatine, celluloid, pyroxyline, fats, oils, etc., blisters the skin, strongly absorbs water from the air, and is miscible with water, alcohol, ether, chloroform and glycerine in all proportions.

Formic Acid.—A colourless liquid of 1.22 sp. gr. (100% acid), miscible with water and alcohol. Weaker solutions are 1.20 (90%), 1.18 (8?%), 1.15 (65%), 1.12 (50%) and 1.06 (25%).

Hydriodic Acid.—A solution of the gas HI, and obtainable as strong as sp. g. 2.0 (=96% HI). Solution of sp. gr. 1.7 contains about 52%, sp. gr. 1.5, about [illegible].

Hydrobromic Acid.—A solution of the gas, HBr, in water. The strongest solution has sp. gr. of 1.78 (= 82%); sol. of 1.49 sp. gr. contains 48% HBr; 1.38, 40%; 1.208, 25%.

Hydrochloric Acid.—A solution of the gas HCl, in water. The commercial strongest acid has sp. gr. 1.16, and contains about 30% HCl. Impure acid is sold as "spirits of salts."

Hydrocyanic Acid (Prussic Acid).—The strength of the official acid of the British Pharmacopoeia is 2%. A 10% acid is obtainable in the chemical trade. Both are the most deadly and dangerous poisons.

Hydrofluoric Acid is a strongly fuming solution of the gas HF. It is sold of strengths 40% and 55% HF.

Lactic Acid is sold as a colourless syrupy liquid, miscible with water or alcohol. Sp. gr. 1.21. A weaker acid is also sold commercially containing 50% acid.

TABLE OF THE SOLUBILITIES, &c.—CONTINUED

	One part is soluble in parts of water — Cold	Boiling		Solubility in Alcohol.
Acid oxalic	9 5	0 3	101	
„ phosphoric				
„ picric	100		1	1 in 10 90, also in ether
„ pyrogallic	2¼	[illegible]	11	[illegible] also in ether, not in chloroform
„ salicylic	500	12½	[illegible]	1 in 3 5, 1 in [illegible] in ether
„ tannic	0 5		50	1 in 0 6, nearly in ol in ether
„ tartaric	[illegible]		1 [illegible]	
Adurol				
Agar-agar				
Albumen				
Alum, ammonia	8 3	0 1	12	insoluble
„ chrome	6	dec	16	
„ iron ammonia	3	dec	3	insoluble
„ potash	10	[illegible]	9 6	insoluble
Aluminium, chloride	½	[illegible]	400	soluble
„ sulphate	3	1 1	35	

Nitric Acid Strongly corrosive liquid of 1 42 [illegible] HNO_3 soluble in water, oxidises alcohol and other organic solvents

Phosphoric Acid Sold as syrupy liquid that of 1 75 [illegible] about [illegible] being intended when "phosphoric acid" is prescribed in formula

Sulphuric Acid The commercial strong acid is a thick corrosive liquid of 1 84 sp gr (98, H_2SO_4) It absorbs water rapidly from the air and mixed with water great heat is developed The acid should always be added to water not *vice versa*

Sulphurous Acid Solution in water of the gas SO_2, saturated solution [illegible] equivalent to 9 5°, H_2SO_3, but soon loses strength

Albumen On heating the cold solution to 160 F the albumen separates in insoluble form Alcohol similarly coagulates albumen

Methyl Alcohol (sp gr 0 810) The chief constituent of crude "wood spirit," or wood naphtha, in which is usually 10°, of acetone

Ethyl Alcohol forms "absolute alcohol" (sp gr 0 820 to 0 830) which contains from to 5°, water Alcohol containing 16°, water is "rectified spirit" "Methylated" spirit consists of rectified spirit *plus* 10 , crude wood spirit and [illegible] mineral naphtha, the latter precipitating as a milkiness on addition of water The above forms of alcohol mix with water, which can be abstracted with dry potassium carbonate

Aluminium Chloride —100 [illegible] saturated solution (sp gr , 1 35) contains 41 1 [illegible] aluminium chloride

TABLES OF THE SOLUBILITIES, &c.—CONTINUED

Name	One part is soluble in — parts of water: Cold	Boiling	100 parts of water dissolve at ordinary temperature	Solubility in Alcohol, &c.
Aluminium, sulphocyanide				
Amidol	4	v. s.	24	less sol. in alc. & eth.
Ammonium, bichromate	5	¼	20	1 in 31 absolute alc.
" bromide	1 ½	v. s.	72	
" carbonate	4	dec.	25	
" chloride	3	1 4	35	
" citrate	½	s.	200	
" iodide	0 6	s.	165	1 in 4 alc., s. s. in ether
" molybdate	2½	dec.	40	
" nitrate	½	v. s.	200	
" oxalate	23	2 4	4 3	sol.
" persulphate	1½	dec.	65	
" (hydro) sulphide				
" sulphocyanide	0 6	v. s.	160	v. s.
" vanadate	s. s.	s.		
Amyl, acetate				
" alcohol				
Aniline				
Antimony sulphide	insol.			
Aurantia	s. s.			v. s., s. s. in ether
Aurine	s. s.			sol., also in ether
Barium bromide	0 75	0 5	133	v. s. in benzole
" chloride	2 4	1 3	42	insol.
" iodide	½	v. s.	200	1 in 20 alcohol
" nitrate	12	3 1	8	insol.
Bromine	31		3 2	
Cadmium, bromide	0 94	v. s.	106	1 in 3 alc. 1 in 250 eth.
" ammonium bromide	0 7	v.	137	
" chloride	0 71	0 67	140	1 in 8 alcohol
" iodide	1 08	0 75	93	1 in 1 alc. 1 in 3 6 eth.
Calcium, chloride (cryst.)	¼	s.	400	
" " (fused).	1 4	0 65	70	
" sulphate	380	450	0 3	
" hydroxide	700	1 300	0 137	
Ceric sulphate	12	200	8 3	
Chloral hydrate	1		100	1 in 1 5 90% alc., 1 in 50 carbon bisulphide

Aluminium Sulphocyanide is purchased as a reddish solution of 1 16 sp. gr.

Ammonium Sulphide is sold as a deep yellow solution containing also poly sulphides.

Amyl Acetate.—Liquid of sp. gr. 0 876, miscible with alcohol and ether, but not with water. A solvent of fats, oils, resin, pyroxyline and celluloid.

Amyl Alcohol, the chief constituent of fusel oil, is not miscible with water.

Aniline (sp. gr. 1 036) is freely miscible with alcohol or ether, but only very slightly with water. It boils at 356 F. and coagulates albumen.

TABLES OF THE SOLUBILITIES, &c.—CONTINUED.

Name	One part is soluble in — parts of water: Cold	Boiling	100 parts of water dissolve at ordinary temperature	Solubility in Alcohol, &c.
Copper bromide	v.s.	v.s.		
,, chlorid	0.83	v.s.	121	v.s., also in ether.
,, sulphate	2.4	½	40	
Cyanine	s.s.			
Diamidophenol	sol.			
Edinol	sol.			...cohol or ether
Eikonogen	25		4	nearly insol. in al-
Eosine	sol.			insol. in ether
Ether	12		8	
Erythrosine	s.s.			
Glycerine				
Glycin				
Gold, chloride	v.s.	v.s.		
Hydroquinone	17		6	
Iodine	insol.	insol.		sol., also in carbon bisulphide
Iron:				
Ferric chloride (lumps)	v.s.	v.s.		
,, ,, (dry)	0.63	v.s.	160	
,, ammonium citrate (brown)*	1		25	
,, ,, (green)				
,, oxalate				
,, ammonium oxalate	2.1		0.48	
,, potassium ,,	15	0.85	6.6	insol.
,, sodium ,,	1.69	0.55	60	
Ferrous chloride (dry)	2	v.s.	50	
,, ,, (cryst.)	0.68	v.s.	147	
,, oxalate	1500	3800		
,, potass. oxalate				
,, sulphate	1.4	0.27	70	
,, am. sulphate	3		33	
Lead, acetate	1.5	0.5	66	1 in 15 alcohol
Lead, nitrate	2	0.7	50	insol. in ether

Ether (called also "sulphuric ether") is very volatile and inflammable. Boils at 95° F., sp. gr. 0.722.

Formaline.—A commercial strong solution (40%) of formic aldehyde, CH_2O.

Gelatine becomes swollen in cold water and dissolves in hot. Dissolved in the cold by oxalic, acetic, hydrochloric, and nitric acids, barium chloride and chloral hydrate. Precipitated from its solution in water by alcohol.

Glycerine.—Miscible with water or alcohol. Sp. gr. 1.265.

Iodine dissolves freely also in carbon bisulphide or potassium iodide solution.

Ferric Oxalate is very soluble (over 20%), it is partially reduced to ferrous oxalate on heating the solution to 212° F.

Seven parts of ferrous sulphate correspond to 10 parts ferrous ammonium sulphate (... 21.7–22.4% iron ... 14 to 15% iron).

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TABLES OF THE SOLUBILITIES, &c.—CONTINUED.

Name	One part is soluble in parts of water: Cold	Boiling	%	Solubility in Alcohol, &c.
Lithia, caustic	s s			
Lithium, bromide	0.7	0.4	143	
" carbonate	72	138	1.3	v s
" chloride	1¼	0.8	80	
" iodide	0.61	0.2	164	v s
Magnesium, chloride (dry)	1.7	1¼	60	v s
" sulphate	1	0.15	100	
Manganese, sulphate	0.8	1	120	
Mercury, bichloride	16	1.8	6.3	insol in absolute alc
" iodide	150		0.66	1 in 4 90%
Metol	sol			
Ortol	sol			s s, also in ether
Para amido phenol	10		10	
Phenol (see acid carbolic)				1 in 22
Potassium, bicarbonate	4	dec		
" bichromate	10	1	10	
" bitartrate	?	v s	135	
" bromide	1½	1	65	
" carbonate (dry)	0.9	0.64	112	1 in 750
" chlorate	17	2	6	insol
" chloride	3	1.75	33	
" chloroplatinite	6	s	17	
" chromate	2	1.2	50	insol
" citrate	0.6	v s	166	insol
" cyanide	0.8	v s	122	v s
" ferricyanide	2½	1.3	40	1 in 9
" ferrocyanide	3.4	2	29	
" hydrate	½	s	200	insol, insol
" iodide	0.7	½	140	sol
" metabisulphite	sol	dec		1 in 16, 90%
" nitrate	3½	0.4	28	
" nitrite	1	s	100	
" oxalate	3	v s	33	insol
" percarbonate	15	dec	6.5	
" perchlorate	100	5	1	
" permanganate	16		6.25	
" persulphate	50	dec	2	
" sulphocyanide	0.46	v s	220	insol in absolute alc
" acid sulphate	2	0.8	50	
Pyrocatechin	1¼	v s	80	
Rochelle salt	1½	v s	66	
Schlippe's salt	3	v s	33	

TABLE OF THE SOLUBILITIES, &c.—CONTINUED

Name	One part is soluble in — parts of water: Cold	Boiling	100 parts of water dissolve at ordinary temperature	Solubility in Alcohol, &c.
Silver, acetate	100		1	
,, carbonate	insol			
,, chlorate	5	2	20	
,, citrate[1]	insol			
,, cyanide	insol			
,, fluoride[2]	v s	v s		
,, nitrate	0 41	0 1	[illegible]	1 in 26, 90 %
,, nitrite	s s			
,, sulphate	87		1 15	
,, sulphocyanide	insol			
,, tartrate	insol			
Sodium, acetate	2 8	v s	36	1 in 50, 90 %, insol in ether
,, bicarbonate	11 3	dec	8 8	
,, bichromate	1	0 6	100	
,, bisulphite	v s			
,, borate	12 4	½	8	
,, bromide	1 1	0 9	90	1 in 15
,, carbonate (dry)	6	2 2	16 3	
,, ,, (cryst)	1 56	v s	63 2	
,, chloride	3	24	33	
,, chloroplatinate	sol			
,, citrate	sol			s s
,, fluoride	25		4	
,, hydrate (caustic)	v s	v s		
,, hyposulphite	0 6	s	160	insol
,, iodide	0 6	0 4	166	
,, nitrate	1 1	0 [illegible]	85	
,, oxalate	35		3	
,, phosphate	6 7	1	15	
,, sulphide	v s	v s		
,, sulphite (cryst)	2 2	1	45	
,, ,, (dry)	4		25	
,, tri-basic phosphate	0 5	v s	20	
,, tungstate	8 to 12			insol
,, (meta) vanadate	½	v s	200	
Strontium, bromide	1 01	½	100	1 in 30, 90 %
,, chloride	1 96	1	51	
,, ,, (cryst)	1 33	0 6	75	
,, iodide	0 56	0 25	18	
,, nitrate	1 41	1	71	
Thiocarbamide	11	v s	9	v s also in ether

1 Readily soluble in ammonia and hypo

2 $AgF\ 4H_2O$ is almost as soluble as calcium chloride

TABLE OF THE SOLUBILITIES, &c.—Continued.

Name.	One part is soluble in ... parts of water: Cold.	Boiling.	100 parts of water dissolve at ordinary temperature	Solubility in Alcohol,
Thio-sinamine	17		6	1 in 3 90 , also in eth
Thymol	550		0 5	1 in 5 75 90 , also in ether
Tin (stannous), chloride	1 4	[illegible]	66	
Uranium, acetate	[illegible]	[illegible]		
" chloride	[illegible]	[illegible]		
" nitrate	4	[illegible]	200	
Zinc, sulphate	0 62	15	161	

PERCENTAGE OF REAL AMMONIA IN SOLUTIONS OF DIFFERENT DENSITIES AT 14° CENTIGRADE (Carius).

Specific Gravity	Per-centage Ammonia	Specific Gravity	Per-centage Ammonia	Specific Gravity	Per-centage Ammonia	Specific Gravity	Per-centage Ammonia
0 8844	36 0	0 9052	27 0	0 9314	18 0	0 9631	9 0
0 8864	35 0	0 9078	26 0	0 9347	17 0	0 9670	8 0
0 8885	34 0	0 9106	25 0	0 9380	16 0	0 9709	7 0
0 8907	33 0	0 9133	24 0	0 9414	15 0	0 9749	6 0
0 8929	32 0	0 9162	23 0	0 9449	14 0	0 9790	5 0
0 8953	31 0	0 9191	22 0	0 9484	13 0	0 9831	4 0
0 8976	30 0	0 9221	21 0	0 9520	12 0	0 9873	3 0
0 9001	29 0	0 9251	20 0	0 9556	11 0	0 9915	2 0
0 9026	28 0	0 9283	19 0	0 9593	10 0	0 9959	1 0

INDICATORS

(I.e., Colour Tests for Alkalies and Acid.)

	Acid	Alkaline	In presence of Carbon Dioxide
Litmus	Bright red	Blue	Reddish purple
Cochineal	Yellow	Reddish violet	Not affected
Methyl orange	Red	Yellow brown	Not affected
Phenol-phthalein	Colourless	Intense red	Useless

Reactions of Substances to Various Indicators

Substance	Litmus	Methyl Orange	Phenol-phthalein
Alum	acid	neutral	acid
Borax	alkaline	alkaline	neutral
Potass metabisulphite	acid	neutral	acid
Potass oxalate	neutral	neutral	neutral
Rochelle salt	neutral	neutral	neutral
Silver nitrate	acid	neutral	acid
Sodium bicarbonate	alkaline	alkaline	neutral
Sodium citrate	alkaline	alkaline	neutral
Sodium bisulphite	acid	neutral	acid
Sodium sulphite	alkaline	alkaline	neutral
Sodium phosphate	neutral	alkaline	neutral

A TABLE OF ATOMIC WEIGHTS OF THE CHEMICAL ELEMENTS

NAME	Symbol	Atomic Weight in Round Numbers	Accurate Atomic Weight
Aluminium	Al	27	27·1
Antimony	Sb	120	120·2
Argon	A	40	39·9
Arsenic	As	75	75·0
Barium	Ba	137	137·37
Beryllium	Gl	9·1	9·1
Bismuth	Bi	208	208·0
Boron	B	11	11·00
Bromine	Br	80	79·96
Cadmium	Cd	112	112·4
Cæsium	Cs	133	132·9
Calcium	Ca	40	40·1
Carbon	C	12	12·0
Cerium	Ce	140	140·25
Chlorine	Cl	35·5	35·451
Chromium	Cr	52	52·11
Cobalt	Co	59	59·00
Copper	Cu	63·5	63·60
Erbium	Er	166	166·0
Fluorine	F	19	19·0
Gadolinium	Gd	156	156·01
Gallium	Ga	70	70·0
Germanium	Ge	72·5	72·5
Gold	Au	197	197·2
Helium	He	4	4·0
Hydrogen	H	1	1·008
Indium	In	115	115·0
Iodine	I	127	126·97
Iridium	Ir	193	193·0
Iron	Fe	56	55·9
Lanthanum	La	139	138·9
Lead	Pb	207	206·92
Lithium	Li	7	7·03
Magnesium	Mg	24	24·36
Manganese	Mn	55	55·0
Mercury	Hg	200	200·0

A TABLE OF ATOMIC WEIGHTS—Continued

Name	Symbol	Atomic Weight in Round Numbers	Accurate Atomic Weight
Molybdenum	Mo	96	96 0
Neodymium	Nd	144	143 6
Nickel	Ni	59	58 70
Niobium	Nb (Cb)	94	94 0
Nitrogen	N	14	14 01
Osmium	Os	191	191 0
Oxygen (Standard)	O	16	16 0
Palladium	Pd	106	106 5
Phosphorus	P	31	31 0
Platinum	Pt	195 4	194 8
Potassium	K	39	39 15
Praseodymium	Pr	141	140 5
Rhodium	Rh	103	103 0
Rubidium	Rb	85	85 5
Ruthenium	Ru	102	101 7
Samarium	Sm	150	150 3
Scandium	Sc	44	44 1
Selenium	Se	79	79 2
Silicon	Si	28	28 4
Silver	Ag	108	107 93
Sodium	Na	23	23 05
Strontium	Sr	87 5	87 6
Sulphur	S	32	32 06
Tantalum	Ta	183	183 0
Tellurium	Te	128	127 6
Terbium	Tb	160	160 0
Thallium	Tl	204	204 1
Thorium	Th	233	232 5
Thulium	Tu	171	171 0
Tin	Sn	118	119 0
Titanium	Ti	48	48 1
Tungsten	W	184	184 0
Uranium	U	240	238 5
Vanadium	V	51	51 4
Ytterbium	Yb	173	173 0
Yttrium	Yt	89	89 0
Zinc	Zn	65	65 4
Zirconium	Zr	91	90 6

TABLE OF POISONS AND ANTIDOTES Compiled by J. V. El[illegible]

	Poisons	Remarks	Characteristic Symptoms	Antidotes
Vegetable Acid	Oxalic Acid, including Potassium Oxalate	1 dram [illegible] fatal dose [illegible]	Hot burning [illegible] cramps, [illegible]	Chalk [illegible] or magnesia [illegible] water. Plaster or mortar [illegible]
Caustic Alkalies	Ammonia, Potash, Soda	[illegible]	[illegible]	[illegible] water
Metallic Salts	Mercuric Chloride	3 grains [illegible] fatal [illegible]	Acrid [illegible] taste, constriction [illegible] in throat and [illegible]	White and yolk of [illegible] paste [illegible]
	Acetate of Lead	[illegible]	Constriction [illegible]	[illegible]
	Cyanide of Potassium	[illegible] fatal	[illegible]	[illegible] cold affusion [illegible] head and neck [illegible]
		[illegible] Applied to wounds and sores [illegible] skin	[illegible]	[illegible] should be applied [illegible]
	Bichromate of Potassium	[illegible]	[illegible]	[illegible]
		[illegible] Applied [illegible]	[illegible] and ulcers	
Concentrated Mineral Acids	Nitrate of Silver		Powerful [illegible]	Common salt [illegible] given [illegible]
	Nitric Acid	2 drams [illegible] been fatal [illegible] has also been [illegible]	Corrosive [illegible]	[illegible] water
	Hydrochloric Acid, Sulphuric Acid	[illegible] ounce has caused death [illegible]		
		All these Acids [illegible] power [illegible]		
	Iodine	Variable in its action [illegible]	Acrid [illegible]	[illegible] should be encouraged and [illegible] starch given [illegible]
	Ether	[illegible]	[illegible]	Cold affusion and artificial respiration
	Pyrogallol	2 [illegible] sufficient to kill a dog	[illegible]	[illegible] emetic [illegible]

THERMOMETRIC TABLES,

Showing the Assimilation of the Thermometers in Use throughout the World

Centigrade	Réaumur	Fahrenheit	Centigrade	Réaumur	Fahrenheit
100	80.0	212.0	49	39.2	120.2
99	79.2	210.2	48	38.4	118.4
98	78.4	208.4	47	37.6	116.6
97	77.6	206.6	46	36.8	114.8
96	76.8	204.8	45	36.0	113.0
95	76.0	203.0	44	35.2	111.2
94	75.2	201.2	43	34.4	109.4
93	74.4	199.4	42	33.6	107.6
92	73.6	197.6	41	32.8	105.8
91	72.8	195.8	40	32.0	104.0
90	72.0	194.0	39	31.2	102.2
89	71.2	192.2	38	30.4	100.4
88	70.4	190.4	37	29.6	98.6
87	69.6	188.6	36	28.8	96.8
86	68.8	186.8	35	28.0	95.0
85	68.0	185.0	34	27.2	93.2
84	67.2	183.2	33	26.4	91.4
83	66.4	181.4	32	25.6	89.6
82	65.6	179.6	31	24.8	87.8
81	64.8	177.8	30	24.0	86.0
80	64.0	176.0	29	23.2	84.2
79	63.2	174.2	28	22.4	82.4
78	62.4	172.4	27	21.6	80.6
77	61.6	170.6	26	20.8	78.8
76	60.8	168.8	25	20.0	77.0
75	60.0	167.0	24	19.2	75.2
74	59.2	165.2	23	18.4	73.4
73	58.4	163.4	22	17.6	71.6
72	57.6	161.6	21	16.8	69.8
71	56.8	159.8	20	16.0	68.0
70	56.0	158.0	19	15.2	66.2
69	55.2	156.2	18	14.4	64.4
68	54.4	154.4	17	13.6	62.6
67	53.6	152.6	16	12.8	60.8
66	52.8	150.8	15	12.0	59.0
65	52.0	149.0	14	11.2	57.2
64	51.2	147.2	13	10.4	55.4
63	50.4	145.4	12	9.6	53.6
62	49.6	143.6	11	8.8	51.8
61	48.8	141.8	10	8.0	50.0
60	48.0	140.0	9	7.2	48.2
59	47.2	138.2	8	6.4	46.4
58	46.4	136.4	7	5.6	44.6
57	45.6	134.6	6	4.8	42.8
56	44.8	132.8	5	4.0	41.0
55	44.0	131.0	4	3.2	39.2
54	43.2	129.2	3	2.4	37.4
53	42.4	127.4	2	1.6	35.6
52	41.6	125.6	1	0.8	33.8
51	40.8	123.8	0	0.0	32.0
50	40.0	122.0			

THERMOMETRIC RULES

The following rules for the rapid conversion of degrees in one system into another will be found useful

To Convert Centigrade into Fahrenheit

Degrees Centigrade × 9 ÷ 5 + 32

Ex. 80 C × 9 ÷ 5 = 144 + 32 = 176 F

To Convert Centigrade into Reaumur

Degrees Centigrade × 4 ÷ 5

Ex. 60 C × 4 ÷ 5 = 48 R

To Convert Fahrenheit into Centigrade

(Degrees Fahrenheit − 32) × 5 ÷ 9

Ex. 100 F − 32 = 68 × 5 ÷ 9 = 37.8 C

To Convert Fahrenheit into Reaumur

(Degrees Fahrenheit − 32) ÷ 9 × 4

Ex. 95 F − 32 = 63 ÷ 9 × 4 = 28 R

To Convert Reaumur into Centigrade

Degrees Reaumur × 5 ÷ 4

Ex. 80 R × 5 ÷ 4 = 100 C

To Convert Reaumur into Fahrenheit

Degrees Reaumur × 9 ÷ 4 + 32

Ex. 16 R × 9 ÷ 4 = 36 + 32 = 68 F

ORTHOCHROMATIC DATA.

DISTRIBUTION OF THE COLOURS IN THE SPECTRUM

(According to Listing.)

		Wave length			Wave length
Brown	Limit	819.8	Cyan Blue	Limit	491.9
	Middle	768.6		Middle	473.0
Red	Limit	723.1	Indigo	Limit	455.5
	Middle	683.2		Middle	439.2
Orange	Limit	647.2	Violet	Limit	424.0
	Middle	614.9		Middle	409.9
Yellow	Limit	585.6	Lavender	Limit	396.7
	Middle	559.0		Middle	384.3
Green	Limit	534.7		Limit	372.6
	Middle	512.4			

WAVE LENGTHS OF BRIGHT LINES OF ELEMENTS USED IN PLOTTING OUT THE SPECTRUM

(In Ten Millionths of a Millimetre, Angstrom Units.)

Table I.

Name of line	Colour	Salts used	Wave lengths λ
Lithium	Red	Lithium chloride or nitrate	6708
Lithium	Orange	Lithium chloride or nitrate	6103
D	Orange	Sodium chloride or bicarbonate	5893
"Little b"	Green	Magnesium ribbon	5183
Strontium	Blue	Strontium chloride or metal	4607
Calcium	Blue	Calcium nitrate or chloride	4227
Potassium	Violet	Potassium chloride	4080

Table I has been drawn up so as to enable any one with nothing more than an ordinary Bunsen gas burner to construct a chart, by means of which the position of any Fraunhofer line in the spectrum may be determined with sufficient accuracy for all photographic purposes. The salts should be dissolved in distilled water so as to form a saturated solution; a narrow loop of copper or iron wire should be wound with fibrous asbestos, and this repeatedly heated in the Bunsen and allowed to cool.

TABLE II

C	Red	Hydrogen tube	6563
"Little b"	Green	Magnesium rod	5183
F	Bluish-green	Hydrogen tube	4861
Magnesium	Blue	Magnesium rod	4481
G	Blue	Hydrogen tube	4308
"Little h"	Blue	Hydrogen tube	4102

Table II will give the data, most easily obtained if a small induction coil is used A small coil, giving a fat ½ or ¼ in spark, and actuated by three bichromate bottles will suffice to show the lines in this table The hydrogen tube is, of course, of the well known Plucker or Salet form The magnesium may be used in twisted spirals of ribbon, but preferably in rod form, and the rods should be filed to comparatively sharp points The constricted portion of the vacuum tube and the points of the magnesium rod should be placed parallel to and not at right angles to the slit

EXPOSURE TABLES.

The following table, based on that of Burton gives a rough idea of the exposures for various subjects and diaphragms under the following conditions

1. Best lighting, midday sunshine in May, June, and July.
2. With the most rapid commercial plates. See below for factors applying to other conditions

f/ No	Average Subjects with Objects in Foreground, Street Scenes, Outdoor Figures	Landscapes with Light Foreground, Lakes, River, and Beach Scenes	Sea, Clouds and Sky	Subjects with Extra Heavy Foreground, Dark Trees, Archways, Groups	Under Trees, Woods, Avenues, Glades, etc.	Portrait in Average Well-lighted Room
f/4	1/250	1/500		1/120	1/20	1/8
f/4·5	1/200	1/400		1/100	1/15	1/7
f/5·6	1/130	1/250		1/64	1/10	1/4
f/6·3	1/100	1/200	1/1000	1/50	1/8	1/3
f/7	1/80	1/150	1/800	1/40	1/7	2/5
f/8	1/64	1/120	1/600	1/30	1/5	1/2
f/11	1/30	1/60	1/300	1/15	1/3	1
f/16	1/15	1/30	1/150	1/8	1	2
f/22	1/8	1/15	1/80	1/4	2	4
f/32	1/4	1/8	1/40	1/2	4	8
f/45	1/2	1/4	1/20	1	8	16
f/64	1	1/2	1/10	2	16	30

In weather other than bright sunshine the above exposures are multiplied as follows :—

Bright diffused light, the sun behind a cloud	1½	Heavy cloud, over the whole sky. Absence of distinct shadows	
Light clouds over the whole sky, but light able to cast a visible shadow		Very dull. Whole sky covered by still heavier	4 to

At other hours of the day and times of the year the above exposures are multiplied by the numbers in the following table of daylight variation. Figure 1 in the table indicates times for which the above exposures are correct.

VARIATION IN DAYLIGHT FROM MORNING UNTIL EVENING (FOR LATITUDE OF BRITISH ISLES, NORTH GERMANY, ETC.)

MORNING

	12	11	10	9	8	7	6	5	4
January	3½	4	5	12					
February	2	2½	3	4	10				
March	1½	1½	1¾	2	[illegible]	6			
April	1¼	1¼	1¼	1½	2	3	6		
May	1	1	1	1¼	1½	2½	[illegible]	6	
June	1	1	1	1	1¼	2	2½	5	12
July	1	1	1	1¼	1½	2½	3	6	
August	1¼	1¼	1¼	1½	2	3	6		
September	1½	1½	1¾	2	3	6			
October	2	2½	3	4	10				
November	3½	4	5	12					
December	4½	5	6						
	12	1	2	3	4	5	6	7	8

AFTERNOON

PINHOLE EXPOSURES.

(WATKINS-POWER NUMBERS *)

W P No	Diameter		Nearest Needle Size	Good Working Distance
	Inch	Inch		Inches
1	0 160	[illegible]		
2	0 080	[illegible]	--	
3	0 055	[illegible]	1	40
4	0 040	[illegible]	4	20
5	0 032	[illegible]	5	14
6	0 027	[illegible]	7	10
7	0 025	[illegible]	8	8
8	0 020	[illegible]	10	5

Rule for use of W P No in Column 1 Multiply W P No of aperture by its working distance from plate Use the result as the f/No in calculating exposure by meter, tables or other means Whatever the calculated result is in seconds or fractions of a second, expose that number of minutes or fraction of a minute Example -W P 6 at 8 inches calculate as f/48

* The principle of this system will be understood from a consideration of an example of focal aperture A ¼-inch aperture at 9 inches f/36 If every second on the actinometer is to be reckoned a minute, the aperture must be one-sixtieth the *area* thus the diameter must be divided by √60 or, near enough, by √64 8 Therefore, an aperture of ¼ 8 $\frac{1}{32}$ inch diameter f 36 when minutes are given instead of seconds Therefore, reasoning backwards, a pinhole of $\frac{1}{32}$-inch diameter is called No 4 (32 8) Similarly one of half the diameter is No 8, and so on Mr Watkins, in order to allow for the exposure in excess of the theoretical which is needed in pinhole photography, calculates minutes as seconds at $\frac{1}{40}$ instead of $\frac{1}{60}$, the *area* of aperture, and therefore his so-called W P (Watkins Power number) is obtained by dividing the denominator of the fraction which expresses the diameter of the pinhole by 6 3 instead of 8 Thus, in the case of a $\frac{1}{38}$ diameter hole, 38 - 6 3 6 2, or, near enough, W P No is 6

TABLE OF COMPARATIVE PLATE SPEED NUMBERS

H & D	Watkins P No	Wynne F No	H & D	Watkins P No	Wynn F No
10	15	24	220	323	114
20	30	28	240	352	120
40	60	49	260	382	124
80	120	69	280	412	129
100	147	77	300	441	134
120	176	84	320	470	138
140	206	91	340	500	142
160	235	103	380	558	150
200	294	109	400	588	154

The above Watkins and Wynne numbers are equivalent to the H and D, only when the latter is determined in accordance with the directions of Hurter and Driffield, that is with pyro-soda developer and using the straight portion only of the density curve

To convert H and D into Watkins Multiply H and D by 50 and divide by 34 For all practical purposes the Watkins P number is 1½ times H and D

To convert Watkins into Wynn F No Extract the square root and multiply by 6 4

The above methods have been approved by the Watkins Meter Company and the Infallible Exposure Meter Company with reference to "Wratten" plates but the co here given may not hold d with every other plate

SHUTTER SPEEDS FOR MOVING OBJECTS

From the "Wellcome Exposure Record and Diary"

The formula and table given below indicate the shutter speeds necessary to secure negatives sufficiently sharp for direct printing For enlarging it is better to give ½ to ¼ these exposures, or to work further from the object *The figures are no guide to what is the correct exposure for the plate*

If D distance of object in feet, F focal length of lens, S speed of object in feet per second, and E exposure for an object moving across the field of view, then

$$E = \frac{D}{100\,F \times S}$$

The following table gives in round figures the shutter speeds necessary for various moving objects, using the ordinary quarter plate lens of about 5 in focus. The column A is for objects moving directly towards the operator, B for objects moving obliquely towards or from the camera, that marked C for objects moving directly across the field of view

Distance of Object, 25 ft., unless otherwise stated	A	B	C
Street groups (no rapid motion)		1/5 to 1/10	
Pedestrians (two miles per hour) / Animals grazing	1/20	1/40	1/60
Pedestrians (three miles per hour)	1/30	1/60	1/90
Pedestrians (four miles per hour)	1/40	1/80	1/120
Vehicles (six miles per hour)	1/60	1/120	1/180
Vehicles (eight miles per hour)	1/80	1/160	1/250
Cyclists and trotting horses	1/160	1/300	1/500
Foot races and sports	1/240	1/500	1/700
Divers		1/600	1/800
Cycle races, horse galloping	1/300	1/750	1/900
Yachts (10 knots per hour) at 50 ft	1/60	1/120	1/180
Steamers (20 knots per hour) at 50 ft	1/120	1/240	1/360
Trains (30 miles per hour) at 50 ft	1/150	1/300	1/450
Trains (60 miles per hour) at 50 ft	1/300	1/600	1/900

At 50 ft. the exposure may be double that at 25 ft.
At 100 ft. the exposure may be double that at 50 ft.

OPTICAL CALCULATIONS.

Optical Rules and Equations

CONJUGATE FOCI

Let f = focal length.

u = nodal distance of object measured from node of admission.

v = nodal distance of image measured from node of emission.

d = extra focal distance of object measured from *front principal focus*, i.e., from one focal length in front of lens.

x = extra focal distance of image measured from *back principal focus*, i.e., from one focal length behind lens.

R = linear ratio of $\frac{\text{object}}{\text{image}}$. This is greater than 1 when reducing, less than 1 when enlarging.

Then

$$u = \frac{vf}{v-f} = Rv = (R+1)f$$

$$v = \frac{uf}{u-f} = \frac{u}{R} = \left(\frac{1}{R}+1\right)f$$

$$d = u-f = \frac{f^2}{x} = Rf$$

$$x = v-f = \frac{f^2}{d} = \frac{f}{R}$$

Definitions. *Principal Focus.*—This is the focus to which the lens brings parallel rays emanating from a point at an infinite distance. If we focus directly on a star the image is at the back principal focus. A corresponding point in front of the lens at the position the image would occupy if the lens were reversed is the front principal focus.

Node.—If we focus on a distant star the image will remain stationary when the lens is rotated through a small arc in any direction about one fixed point. This point is the node of emission. The node of admission is a corresponding point that will have the same properties if the lens is reversed.

A distance measured from a node is termed a nodal distance.

A distance measured from a principal focus is an extra-focal distance. In general it is most convenient to measure distances in this way.

The nodal distance of back principal focus from node of emission is equal to that of the front principal focus from node of admission, and is called the focal length of the lens.

SCALE OF IMAGE

Let r = ratio of $\frac{\text{image}}{\text{object}}$

Then $\frac{1}{R} = \frac{v}{u} = \frac{f}{d} = \ldots$

CALCULATION OF FOCAL LENGTH

Various useful methods can be based on following equations:—

$$f = \frac{uv}{u+v} = \frac{u}{R+1} = \sqrt{dd'} = Rd = \frac{d'}{R}$$

A simple and accurate method is only to first to focus the lens on an object at an infinite distance (see table on page 898), and to mark the position of any convenient part of the moving lens front on the fixed camera base-board, then place any object such as a foot rule before the camera, and focus by moving only (1) camera as a whole and (2) camera front on baseboard, not back of camera—until image on screen is same size as original. The distance through which the camera front has to be moved to secure this is the focal length of the lens, and is indicated by the separation of the mark on the fixed baseboard from that on the lens front in its final (same size) position.

COMBINING LENSES

Let f_1 and f_2 = focal lengths of respective lenses

s = separation measured from node of emission of front lens to node of admission of back lens (termed nodal separation)

F = focal length of combination

$$F = \frac{f_1 f_2}{f_1 + f_2 - s}$$

If one lens is a symmetrical doublet and the other a supplementary lens placed *inside* the doublet, then, approximately, s = half the extreme outside length of the doublet. The value of s should not be neglected unless very small.

EXPOSURE

In exposure we consider effective aperture, and the diameter of the effective aperture is that of the largest parallel beam of light that can enter and pass through the objective.

Let c = v divided by diameter of effective aperture = so-called "ratio number" of aperture

f, v, and r represent same quantities as before.

Then $\frac{v}{c}$ = diameter of effective aperture

$= \frac{f}{c}$ when object is distant.

Exposure always varies inversely with $\left(\frac{v}{c}\right)$

With any one lens it varies directly in proportion to the value of e^2, or of v^2, or of $(r + 1)^2$, if either the stop or the scale is altered.

With different lenses with apertures of same diameter exposure varies directly with f^2, provided images of the same size are produced from near objects, as in copying. If images of different sizes are produced exposure varies directly with f^2, *only* when focussing on infinity. In all other cases the value of $\left(\frac{v}{e}\right)^2$ must be determined to compare relative exposures.

Exposure is always the same so long as the value of e is the same, however much other factors may be varied.

DEPTH OF FIELD.

Depth of field is governed by angular aperture, which is a measure of the angle at the apex of the cone of light reaching the plate when focussing on an infinitely distant point of light. The diameter of the angular aperture is the diameter of the base of the cone when its height is made equal to the focal length. Depth is often calculated on effective aperture; this introduces small errors that are very generally ignored.

Let a = focal length divided by diameter of angular aperture.
c = diameter of circle of confusion. Usually taken as 0.01 inch, but for critical definition 0.005 is necessary.
H = hyperfocal distance (see definition below).

$$\text{Then } H = \frac{f^2}{ac} = \frac{100f^2}{a} \text{ when } c = 0.01 \text{ inch,}$$

measuring all distances from node of admission.

If we focus on infinity the nearest object in focus is at a distance H. A table of various values of H will be found later in this volume.

If we focus on a distance equal to $H + f$, all objects are in focus from $\frac{H + f}{2}$ up to infinity. This is the maximum amount of depth possible.

If we focus on a point at a distance u the distance of nearest object in focus

$$= \frac{Hu}{H + u - f} = \frac{Hu}{H + d}$$

and the distance of farthest object in focus

$$= \frac{Hu}{H - u + f} = \frac{Hu}{H - d}$$

When f is small compared with u it can be disregarded, and u and d can be considered equal, while distances can be measured either from the node or the principal focus.

Very approximately, when we focus on a distance equal to $\frac{H}{n}$, depth extends from $\frac{H}{n + 1}$ to $\frac{H}{n - 1}$.

If an image produced with a lens of focal length f and with aperture of $f/$ number a is enlarged n times the result is equivalent both as regards size and depth, to one produced directly with a lens of focal length nf and aperture f number na, that is, an aperture of the same diameter

To produce the same depth with two different lenses the aperture f numbers must vary in proportion with the squares of the focal lengths

PERSPECTIVE

is controlled entirely by distance of object from entrance pupil of lens The entrance pupil is the image of the stop aperture seen through the front lens If the lens is rotated about the centre of the pupil, the stop appears to remain stationary In a landscape lens the pupil is the stop In a symmetrical doublet it is the node of admission In a telephoto lens it is the node of admission of the front combination, not that of the entire objective

The proper viewing distance for the print is equal to v, excepting in the cases considered below

CORRECTION FOR INCONSTANCY OF APERTURE

With many lenses the aperture varies according to the side of the lens that it is measured upon, and in such cases it varies in diameter with the distance of the object, or is inconstant All preceding rules and formulæ assume it to be constant, hence the results are in error for near objects They can, however, be corrected by the following method The correction for exposure is important when such a lens is used for enlarging See table of "Relative Exposures for Varying Proportions of Image to the Original."

Let y = distance between entrance pupil and node of admission If pupil is in front of node y is positive, if behind node y is negative

The depth is corrected by multiplying results obtained by ordinary formulæ by $1 + \frac{y}{u}$ Exposure by multiplying by $\left(1 + \frac{y}{u}\right)$ Viewing distance Perspective varies with value of u y

When object is distant $1 + \frac{y}{u} = 1$ therefore no correction is required With constant lenses $y = o$

The value of y can be measured directly by taking advantage of the facts that, with the objective reversed, the image is stationary when the objective is rotated about its node of admission, and that the apparent stop aperture seen through the front combination is stationary when the objective is rotated about the centre of the entrance pupil

The telephoto lens is inconstant, but by adopting the usual magnification method of making calculations, all above corrections are allowed for If, however, we treat the telephoto as a complete objective of certain focal length, then with near objects the corrections must be made, otherwise all the results obtained are wrong

CORRECTION OF CONVERGENT DISTORTION

The distorted image must be corrected by copying in the camera on an enlarged scale, with distorted image and enlargement inclined in opposite directions A corrected and enlarged positive can thus be made from the original negative, or a corrected enlarged negative from a transparency made from the original by contact printing

Let A = angle of tilt of camera back from vertical at time of original exposure

Let N = angle of inclination from vertical of distorted image in correction process

Let C = angle of inclination from vertical of new enlarged copy

Then use original lens, and adjust apparatus to enlarge [illegible] scale of 2 to 1, taking measurements on a horizontal line through centre of plate

Make C equal to A

Adjust N until convergency disappears

Stop down as required to secure focus

Care must be taken to preserve the proper scale of enlargement, which may be upset in adjusting the angles C and N The enlargement must not be less than 2 to 1, but may be more with advantage

If A is not recorded it can be easily found, for, when enlarging on scale of 2 to 1, it is equal to [illegible] the angle of inclination required to remove convergency by tilting either copy or distorted image alone

If A does not exceed 16°, the method given is sufficiently accurate for all practical purposes The theoretically exact method is impractically complex

Though convergency can be corrected by inclining either copy or distorted image alone the result is incorrect, as the height of the image is then either increased or very much dwarfed

If a reduced corrected copy is required, the required particulars can be taken from the following table The first column gives the value of r or of $\frac{\text{image}}{\text{object}}$ The second and third the proper values of the angles C and N The fourth the factor for finding A when that angle is not known, and the fifth the extreme value of A for which the table gives approximately correct results In applying Column 4 the new copy (or the focussing screen) must be inclined alone until convergency disappears, the negative being upright A is then equal to the angle found multiplied by the number given The original lens is to be used

r	C	N	A	
1	2	3	4	5
[illegible]	2 0 1	2 1 1	[illegible]	5
[illegible]	2 12.1	1 87.1	[illegible]	7
[illegible]	1 66 1	1 33.1	[illegible]	8
[illegible]	1 45 1	1 05.1	[illegible]	9
[illegible]	1 34.1	0 9.1	[illegible]	11

When reducing sharp focus can only be secured with the aid of a small stop When enlarging a bigger aperture can be employed

STEREOSCOPIC FACTS AND FIGURES

True stereoscopic effect depends on true perspective

True aerial perspective depends on true gradation and values

True linear perspective upon absence of distortion, and upon viewing every part of the images at the same angle of convergency as that at which it was seen by the camera lenses

To secure correct conditions of convergency each print must be seen under the same angle of view as that at which it was produced, and the two prints must be mounted in accord with the following rules

Let P = separation of any pair of corresponding points on prints

N = separation of same points on negatives

E = separation of eyes (average is 64 mm)

L = separation of camera lenses

A non prismatic stereoscope being used —

1 If image points represent infinitely distant objects, make $P = E$

2 If only near objects are shown and an ordinary single plate double lens stereo camera has been used

Make $P = E + L - N$

3 If a single camera is used for two separate exposures, or if two separate similar cameras are used together, measure N with negatives placed edge to edge and in the same relative positions that they occupied during exposure, and then

Make $P = E - N +$ length of one plate.

If a prismatic stereoscope, fitted with properly centred half lenses is used, add the width of one prism to above values of P

Hints 1 Aim at soft negatives full of correct gradations, and use printing process showing as little grain and texture as possible.

2 Mount so that horizon line is opposite centre of eyes.

3. Trim so that separation of corresponding margins is only just less than that between images of nearest object

4. Use light or dark mount according as subject is lighted from the front or back.

5 With very near objects adjust separation of camera lenses until each image shows required amount of subject.

TELEPHOTO CALCULATIONS

F equivalent focal length of complete lens

f_1 equivalent focal length of positive

f_2 equivalent focal length of negative

E camera extension, from negative lens to ground glass

M magnification that is number of times the image given by the complete lens is larger than that given by positive alone

Magnification when working at given extension is found by dividing camera extension by focal length of negative lens and adding 1

$$M = \frac{E}{f_2} + 1$$

Camera extension, necessary for given magnification — multiply focal length of negative lens by magnification less 1

$$E = f_2 (M - 1)$$

Focal length of complete lens — Multiply focal length of positive by magnification

DIAPHRAGM NUMBERS

Equivalent f/ and Uniform System Numbers

Rel. Exposure Req'd.	1	2	4	8	16	32	64	128
F Nos.	f/4	5.6	8	11.3	16	22.6	32	45.2
U. S. Nos.	1	2	4	8	16	32	64	128

NOTE.—Most lenses are now marked with the f/ numbers, although the U. S. numbers are used on Kodak lenses. Also the actual diameter of the diaphragm aperture in millimetres is marked on Zeiss lenses, such as the "convertible."

APPROXIMATE INFINITY FOR LENSES OF VARIOUS FOCAL LENGTHS

By C. Welborne Piper, from "The First Book of the Lens."

Focal Length, Inches	1/100 in.	1/250 in.	1/500 in.	1/1000 in.
1	3 yd.	7½ yd.	15 yds.	30 yds.
2	11 ,,	28 ,,	55 ,,	110 ,,
3	25 ,,	63 ,,	125 ,,	250 ,,
4	45 ,,	113 ,,	225 ,,	450 ,,
5	70 ,,	175 ,,	350 ,,	700 ,,
6	100 ,,	250 ,,	500 ,,	1000 ,,
7	136 ,,	340 ,,	680 ,,	1360 ,,
8	178 ,,	¼ mile	½ mile	1 mile
9½	264 ,,	660 yds.	¾ ,,	1½ miles
11¼	351 ,,	½ mile	1 ,,	2 ,,
12½	434 ,,	1085 yds.	1¼ miles	2½ ,,
13¾	525 ,,	¾ mile	1½ ,,	3 ,,
16	700 ,,	1 ,,	2 ,,	4 ,,
17½	875 ,,	1¼ miles	2½ ,,	5 ,,
19¼	1056 ,,	1½ ,,	3 ,,	6 ,,
21	1225 ,,	1¾ ,,	3½ ,,	7 ,,
22½	1406 ,,	2 ,,	4 ,,	8 ,,
24	1600 ,,	2¼ ,,	4½ ,,	9 ,,
25	1 mile	2½ ,,	5 ,,	10 ,,
28	1¼ mile	3¼ ,,	6½ ,,	13 ,,
30	1½ ,,	3¾ ,,	7½ ,,	15 ,,
33	1¾ ,,	4½ ,,	9 ,,	18 ,,
35	2 ,,	5 ,,	10 ,,	20 ,,

By focussing accurately on distances not less than those given, we ensure that the focussing-screen is within 1/100, 1/250, 1/500, or 1/1000 in. from the true principal focus.

TABLE FOR ENLARGEMENTS

Focus of Lens, inches	TIMES OF ENLARGEMENT AND REDUCTION							
	1 inches	2 inches	3 inches	4 inches	5 inches	6 inches	7 inches	8 inches
3	6 6	9 4 1/2	12 4	15 3 3/4	18 3 3/5	21 3 1/2	24 3 3/7	27 3 3/8
3 1/2	7 7	10 1/2 5 1/4	14 4 2/3	17 1/2 4 3/8	21 4 1/5	24 1/2 4 1/12	28 4	31 1/2 3 15/16
4	8 8	12 6	16 5 1/3	20 5	24 4 4/5	28 4 2/3	32 4 4/7	36 4 1/2
4 1/2	9 9	13 1/2 6 3/4	18 6	22 1/2 5 5/8	27 5 2/5	31 1/2 5 1/4	36 5 1/7	40 1/2 5 1/16
5	10 10	15 7 1/2	20 6 2/3	25 6 1/4	30 6	35 5 5/6	40 5 5/7	45 5 5/8
5 1/2	11 11	16 1/2 8 1/4	22 7 1/3	27 1/2 6 7/8	33 6 3/5	38 1/2 6 5/12	44 6 2/7	49 1/2 6 3/16
6	12 12	18 9	24 8	30 7 1/2	36 7 1/5	42 7	48 6 6/7	54 6 3/4
7	14 14	21 10 1/2	28 9 1/3	35 8 3/4	42 8 2/5	49 8 1/6	56 8	63 7 7/8
8	16 16	24 12	32 10 2/3	40 10	48 9 3/5	56 9 1/3	64 9 1/7	72 9
9	18 18	27 13 1/2	36 12	45 11 1/4	54 10 4/5	63 10 1/2	72 10 2/7	81 10 1/8
10	20 20	30 15	40 13 1/3	50 12 1/2	60 12	70 11 2/3	80 11 3/7	90 11 1/4
11	22 22	33 16 1/2	44 14 2/3	55 13 3/4	66 13 1/5	77 12 5/6	88 12 4/7	99 12 3/8
12	24 24	36 18	48 16	60 15	72 14 2/5	84 14	96 13 5/7	108 13 1/2

The object of this table is to enable any manipulator who is about to enlarge (or reduce) a copy any given number of times to do so without troublesome calculation. It is assumed that the photographer knows exactly what the focus of his lens is, and that he is able to measure accurately from its optical centre. The use of the table will be seen from the following illustration: A photographer has a *carte* to enlarge to four times its size, and the lens he intends employing is one of six inches equivalent focus. He must, therefore, look for 4 on the upper horizontal line, and for 6 in the first vertical column, and carry his eye to where the two join, which will be at 30 - 7½. The greater of these is the distance the sensitive plate must be from the centre of the lens, and the lesser, the distance of picture to be copied. To *reduce* a picture any given number of times the same method must be followed, but in this case the greater number will represent the distance between the lens and the picture to be copied, the latter, that between the lens and the sensitive plate. This explanation will be sufficient for every case of enlargement or reduction.

RELATIVE EXPOSURES FOR VARYING PROPORTIONS OF IMAGE TO THE ORIGINAL.

(W. L. DEBENHAM'S TABLE.)

To find the relative exposure, add one to the number of times that the length of the original is contained in the length of the image, and square the sum. This will give the figure found in the third column of the annexed table.

As examples, suppose a copy is wanted having twice the linear dimensions of the original. Take the number 2, add 1 to it, and square the sum, $3^2 = 9$. Again, if a copy is to be of eight times the linear dimensions of the original, take the number 8, add 1, and square the sum, $9^2 = 81$. Copies respectively twice and eight times the size (linear) of the original will thus require relative exposures of 9 and 81, *i.e.*, the latter will require nine times the exposure of the former.

It is convenient to have a practical standard for unity. An image of the same size as the original is a familiar case, and serves as such standard. By dividing the figures in the third column by four, we get at the figures in the last column, which represent the exposure required for varying degrees of enlargement or reduction, compared with the exposure for a copy of the same size.

The table is carried up to enlargements of thirty diameters, that is about the amount required for enlarging a *carte de visite* to life size.

The exposures required in reductions do not vary at all to the same extent that they do in enlargements. It has, therefore, not been thought necessary to fill in the steps between images of $\frac{1}{10}$ and $\frac{1}{20}$, and between $\frac{1}{20}$ and $\frac{1}{30}$ of the size of the original. Beyond $\frac{1}{10}$ there is scarcely any perceptible difference in the exposure until disturbance comes in from another cause, a considerable distance of illuminated atmosphere (haze or fog) intervening.

The figures in the second column will also serve as a table for distances from the lens to the plate and to the original, all that is necessary being to multiply by the principal focus of the lens in use. In the case of enlargements the figures less than 2 must be multiplied to get the distance from the original to the lens, and the figures greater than 2 for the distance from lens to image. For reductions the figures less than 2, multiplied by the principal focus of the lens, yield the distance from lens to plate, and the figures higher than 2, similarly multiplied, give the distance of original from lens.

With single "view lenses" the size of the effective aperture is different on the two sides of the lens, and the rapidity of the lens therefore varies with the side presented to the original. Therefore exposures can only be compared by the table when the same side of the lens is towards the original. The aperture also varies with the distance of the original, and the table does not accurately apply when enlarging. When reducing with a single lens the table gives approximately accurate results. It only applies accurately in all circumstances with doublets.

Proportion of image to original (linear)	Distance of image from lens in terms of principal focus	Proportionate exposures	Exposures proportioned to that required for copying same size
1/30	1 1/30	1 07	0 27
1/20	1 1/20	1 10	0 28
1/10	1 1/10	1 21	0 3
1/8	1 1/8	1 27	0 31
1/6	1 1/6	1 36	0 34
1/4	1 1/4	1 56	0 39
1/2	1 1/2	2 25	0 56
3/4	1 3/4	3 06	0 76
(Same size) 1	2	4	1
2	3	9	2 25
3	4	16	4
4	5	25	6 25
5	6	36	9
6	7	49	
7	8	64	16
8	9	81	20 25
9	10	100	25
10	11	121	30 25
11	12	144	36
12	13	169	42 25
13	14	196	49
14	15	225	56 25
15	16	256	64
16	17	289	72 25
17	18	324	81
18	19	361	90 25
19	20	400	100
20	21	441	110 25
21	22	484	121
22	23	529	132 25
23	24	576	144
24	25	625	156 25
25	26	676	169
26	27	729	182 25
27	28	784	196
28	29	841	210 25
29	30	900	225
30	31	961	240

With a double lens it is usually sufficient to measure from the position of the diaphragm plate

TABLE OF VIEW-ANGLES

By Clarence B. Woodman, Ph.D.

Divide the Base* of the Plate by the Equivalent Focus of the Lens.

If the quotient is	The angle is	If the quotient is	The angle is	If the quotient is	The angle is
	Degrees		Degrees		Degrees
0.282	16	0.748	41	1.3	66
0.3	17	0.768	42	1.32	67
0.317	18	0.788	43	1.36	68
0.335	19	0.808	44	1.375	69
0.353	20	0.828	45	1.4	70
0.37	21	0.849	46	1.427	71
0.389	22	0.87	47	1.45	72
0.407	23	0.89	48	1.48	73
0.425	24	0.911	49	1.5	74
0.443	25	0.933	50	1.53	75
0.462	26	0.954	51	1.56	76
0.48	27	0.975	52	1.59	77
0.5	28	1.0	53	1.62	78
0.517	29	1.02	54	1.649	79
0.536	30	1.041	55	1.678	80
0.555	31	1.063	56	1.7	81
0.573	32	1.086	57	1.739	82
0.592	33	1.108	58	1.769	83
0.611	34	1.132	59	1.8	84
0.631	35	1.155	60	1.833	85
0.65	36	1.178	61	1.865	86
0.67	37	1.2	62	1.898	87
0.689	38	1.225	63	1.931	88
0.708	39	1.25	64	1.965	89
0.728	40	1.274	65	2.0	90

Example.—Given a lens of 13 inches equivalent focus, required the angle included by it on plate 3¼ × 4¼.

Dividing 4.25 by 13, we have as quotient 0.327—midway between the decimals 0.317 and 0.335 of our table; therefore the required angle is 18° 30′.

* More accurately the diagonal of the plate, inasmuch as the field of the lens is circular, and if the corners of the plate are to be covered the angle embraced by the lens should be sufficient to cover the diagonal of the plate.

The lengths of the diagonals of the plates most commonly used are:—

3¼ × 3¼	diagonal 4.6 inches		7½ × 5	diagonal 9.0 inches
3¼ × 4¼	" 5.3 "		6½ × 8½	" 10.7 "
5 × 4	" 6.4 "		10 × 8	" 12.8 "
4¾ × 6½	" 8.0 "		12 × 10	" 15.6 "
7 × 5	" 8.6 "		15 × 12	" 19.2 "

MR E. M NELSON'S TABLE OF DISTANCES FOR LANTERN PROJECTION

DISTANCE OF PROJECTION LENS FROM SCREEN, MASK BEING THREE INCHES

4½		5		5½		6		7		8		9		10		11		12		14		15		16		18	
ft	in	ft	in	ft	in	ft	in	ft	in	ft	in	ft	in	ft	in	ft	in	ft	in	ft	in	ft	in	ft	in	ft	in
7	10½	8	9	9	7½	10	6	12	3	14	0	15	9	17	6	19	3	21		24	6	26	3	28	0	31	6
9	4½	10	5	11	5½	12	6	14	7	16	8	18	9	20	10	22	11	25		29	2	31	3	33	4	37	6
10	10½	12	1	13	3½	14	6	16	11	19	4	21	9	24	2	26	7	29		33	10	36	3	38	8	43	6
12	4½	13	9	15	1½	16	6	19	3	22	0	24	9	27	6	30	3	33		38	6	41	3	44	0	49	6
13	10½	15	5	16	11½	18	6	21	7	24	8	27	9	30	10	33	11	37		43	2	46	3	49	4	55	6
15	4½	17	1	18	9½	20	6	23	11	27	4	30	9	34	2	37	7	41		47	10	51	3	54	8	61	6
16	10½	18	9	20	7½	22	6	26	3	30	0	33	9	37	6	41	3	45		52	6	56	3	60	0	67	6
18	4½	20	5	22	5½	24	6	28	7	32	8	36	9	40	10	44	11	49		57	2	61	3	65	4	73	6
19	10½	22	1	24	3½	26	6	30	11	35	4	39	9	44	2	48	7	53		61	10	66	3	70	8	79	6
21	4½	23	9	26	1½	28	6	33	3	38	0	42	9	47	6	52	3	57		66	6	71	3	76	0	85	6
22	10½	25	5	27	11½	30	6	35	7	40	8	45	3	50	10	55	11	61		71	2	76	3	81	4	91	6
24	4½	27	1	29	9½	32	6	37	11	43	4	48	9	54	2	59	7	65		75	10	81	3	86	8	97	6
27	4½	30	5	33	5½	36	6	42	7	48	8	54	9	60	10	66	11	73		85	2	91	3	97	4	109	6
30	4½	33	9	37	1½	40	6	47	3	54	0	60	9	67	6	74	3	81		94	6	101	3	108	0	121	6
37	10½	42	1	46	3½	50	6	58	11	67	4	75	9	84	2	92	7	101		117	10	136	3	134	8	151	6
45	4½	50	5	55	5½	60	6	70	7	80	8	90	9	100	10	110	11	121		141	2	151	3	161	4	181	6
52	10½	58	9	64	7½	70	6	82	3	94	0	105	0	117	6	129	3	141		164	6	176	3	188	0	211	6
60	4½	67	1	73	9½	80	6	93	11	107	4	120	9	134	3	147	7	161		187	10	201	3	214	8	241	6
67	10½	75	5	82	11½	90	6	105	7	120	8	135	9	150	10	165	11	181		211	2	226	3	241	4	271	6
75	4½	83	9	92	1½	100	6	117	3	134	0	150	9	167	6	184	3	201		234	6	251	3	268	0	301	6

TABLE OF DISTANCES FOR AN OBJECT OF SIXTY-EIGHT INCHES HEIGHT

COMPUTED BY P. BIOSI.

Equivalent Focus (Inches)	Heights of Images (Inches): 1	2	3	4	6	8	10	12	14	16	20	24	28	32	40	48	56	68
2	138.0 3.0	70.0 2.1	47.3 2.1	36.0 2.1														
3	207.0 3.0	105.0 3.1	71.0 3.1	54.0 3.2	37.0 3.3													
4	276.0 4.1	140.0 4.1	94.7 4.2	72.0 4.2	49.3 4.4	38.0 4.5												
5	345.0 5.1	175.0 5.1	118.3 5.2	90.0 5.3	61.7 5.4	47.5 5.6	39.0 5.7											
6	414.0 6.1	210.0 6.2	142.0 6.3	108.0 6.4	74.0 6.5	57.0 6.7	46.8 6.9	40.0 7.1	35.1 7.2									
7	483.0 7.0	245.0 7.1	165.7 7.3	126.0 7.4	86.3 7.6	66.5 7.8	54.6 8.0	46.7 8.2	41.0 8.4	36.7 8.6								
8	552.0 8.1	280.0 8.2	189.3 8.4	144.0 8.5	98.7 8.7	76.0 8.9	62.4 9.2	53.3 9.4	46.[illegible] 9.[illegible]	42.0 9.9	35.2 10.4							
9	621.0 9.1	315.0 9.3	213.0 9.4	162.0 9.5	111.0 9.8	85.5 10.1	70.2 10.3	60.0 10.6	52.7 1[illegible]	47.2 11.1	39.6 11.6							
10	690.0 10.1	350.0 10.3	236.7 10.4	180.0 10.6	123.3 10.9	95.0 11.2	78.0 11.5	66.7 11.8	58.6 12.1	52.5 12.4	44.0 12.9	38.3 13.5	34.3 14.1					
11	759.0 11.2	385.0 11.3	260.3 11.5	198.0 11.6	135.7 12.0	104.5 12.3	85.8 12.6	73.3 12.9	64.4 13.3	57.7 13.6	48.4 14.2	42.2 14.9	37.7 15.5	34.4 16.2				
12	828.0 12.2	420.0 12.4	284.0 12.5	216.0 12.7	148.0 13.1	114.0 13.4	93.6 13.8	80.0 14.1	70.3 14.5	63.0 14.8	52.8 15.5	46.0 16.2	41.1 16.9	37.5 17.6				
13	897.0 13.2	455.0 13.4	307.7 13.6	234.0 13.8	160.3 14.1	123.5 14.5	101.4 14.9	86.7 15.3	76.1 15.7	68.2 16.1	57.2 16.8	49.8 17.6	44.[illegible] 18.4	40.6 19.1	35.1 20.[illegible]			

Values are omitted in this space on account of the [illegible] amount of space required (More than ninety degrees.)

14	[illegible] 14 2	490 0 14 4	331 3 14 6	[illegible] 14 5	[illegible] [illegible]	153 0 15 6	109 2 16 1	[illegible] [illegible]	82 0 16 9	73 5 17 3	61 6 18 0	53 7 18 9	[illegible] 19 8	[illegible] 20 6	37 [illegible] 22 2				
16	1101 16 2	560 0 15 5	378 7 16 7	288 0 [illegible]	197 3 17 4	[illegible] 17 9	[illegible] [illegible]	[illegible] 18 8	[illegible] [illegible]	84 0 19 8	70 4 20 7	61 3 21 6	54 9 22 [illegible]	50 0 23 5	43 [illegible] 25 4	38 7 27 3	35 4 29 2		
18	1242 18 3	630 0 15 [illegible]	[illegible] [illegible]	324 0 19 1	222 0 19 [illegible]	171 0 20 [illegible]	[illegible] 20 6	120 0 [illegible]	105 4 21 7	[illegible] 22 2	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	56 2 26 5	46 6 [illegible]	43 5 30 7	39 9 32 8	36 0 36 0	
20	[illegible] [illegible]	700 0 [illegible]	473 3 [illegible]	360 0 [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	117 1 24 1	105 0 24 7	[illegible] [illegible]	76 7 27 [illegible]	[illegible] [illegible]	62 5 [illegible]	54 0 31 8	[illegible] 34 1	44 3 36 5	40 0 40 0	
22	1518 22 3	770 0 [illegible]	[illegible] [illegible]	[illegible] 23 3	[illegible] 23 9	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	128 9 26 5	[illegible] 27 2	[illegible] [illegible]	[illegible] [illegible]	75 [illegible] [illegible]	[illegible] [illegible]	59 4 [illegible]	[illegible] 37 [illegible]	48 7 40 1	44 0 44 0	
24	[illegible] [illegible]	[illegible] [illegible]	566 0 25 1	[illegible] 25 [illegible]	[illegible] 26 1	[illegible] [illegible]	[illegible] [illegible]	160 0 [illegible]	140 6 [illegible]	126 0 29 6	[illegible] [illegible]	[illegible] 32 5	92 3 [illegible]	75 0 35 3	64 8 36 1	58 0 40 9	53 1 43 8	48 0 48 0	
26	[illegible] 26 4	[illegible] [illegible]	615 3 27 [illegible]	[illegible] 27 [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] 24 8	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	91 2 38 2	70 2 41 3	62 8 44 4	57 6 47 4	52 0 52 0	
28	[illegible] [illegible]	[illegible] [illegible]	662 7 29 2	[illegible] [illegible]	345 [illegible] 30 5	[illegible] 31 3	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	147 0 34 6	[illegible] [illegible]	[illegible] 37 9	[illegible] [illegible]	[illegible] 41 [illegible]	75 6 [illegible]	67 7 47 5	62 0 51 1	56 0 56 0	
32	2208 32 5	[illegible] [illegible]	[illegible] 33 4	576 0 [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] 37 6	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	122 [illegible] 43 3	[illegible] 45 2	100 0 47 1	86 [illegible] 50 [illegible]	77 [illegible] [illegible]	70 9 58 4	64 0 64 0	
36	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] 40 [illegible]	[illegible] 41 [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	132 0 [illegible]	123 4 [illegible]	112 5 52 9	97 2 57 2	[illegible] 61 4	79 7 [illegible]	72 0 72 0	
44	3036 [illegible]	[illegible] [illegible]	[illegible] [illegible]	792 0 46 7	[illegible] 47 [illegible]	[illegible] [illegible]	343 2 [illegible]	[illegible] 51 [illegible]	257 7 [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	137 5 [illegible]	118 8 69 9	106 3 75 1	97 4 80 2	88 0 88 0	
52	[illegible] 52 8	1820 53 [illegible]	[illegible] [illegible]	[illegible] 55 1	641 [illegible] [illegible]	491 0 [illegible]	405 [illegible] [illegible]	346 7 61 2	304 6 [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] 70 4	175 [illegible] 73 [illegible]	[illegible] 76 5	140 4 [illegible]	125 7 [illegible]	115 1 94 8	104 0 104 0	

This table gives, in inches, the distances from lens to object (greater conjugate focus, upper number) and from lens to ground glass (lesser conjugate focus, lower number) for different heights of images and different lengths of foci of lenses, when the height of object is 66 inches (average height of man).

EXAMPLES

Q.—What is the height of image of a person who is 133 inches distance from lens, when a lens of 14 inches focus is used?
A.—The height of image in this case is 8 inches.

Q.—What are the distances between object, lens, and ground glass if the image of a person is to be 8 inches high and a 14 inches focus lens is employed?
A.—The distance from object to lens will be 133 inches, from lens to ground glass 15 6 inches.

TABLES OF DISTANCES AT AND BEYOND WHICH ALL OBJECTS ARE IN FOCUS WHEN SHARP FOCUS IS SECURED ON INFINITY

Ratio marked on Stops

Number of feet after which all is in focus

Focal length of Lens in inches	f/4	f/5.6	f/6	f/7	f/8	f/10	f/11	f/15	f/16	f/20	f/22	f/32	f/44	f/64
4	35	24	22	19	17	[illegible]	13	9	8	7	6	[illegible]	3	2
4¼	39	27	25	21	19	[illegible]	14	10	10	[illegible]	7	[illegible]	[illegible]	[illegible]
4½	[illegible]	30	28	[illegible]	21	[illegible]	[illegible]	11	[illegible]	8	7½	[illegible]	4	3
4¾	[illegible]	31	[illegible]	27	21	[illegible]	17	12	12	9½	8½	6	5	3
5	52	36	[illegible]	30	26	21	19	14	[illegible]	10	9½	6½	[illegible]	[illegible]
5¼	57	40	[illegible]	33	29	[illegible]	21	15	14	11½	10½	7	5½	[illegible]
5½	[illegible]	[illegible]	[illegible]	36	31	25	25	17	15	12½	11	7½	6	[illegible]
5¾	[illegible]	50	[illegible]	38	[illegible]	27	[illegible]	18	17	[illegible]	[illegible]	8	[illegible]	4
6	[illegible]	51	50	42	38	[illegible]	28	[illegible]	19	15	14	9	7	4½
6¼	81	58	51	46	40	[illegible]	29	22	20	[illegible]	15	10	7½	[illegible]
6½	87	[illegible]	48	50	41	35	[illegible]	23	22	17	[illegible]	11	8	[illegible]
6¾	94	[illegible]	[illegible]	51	47	38	34	25	[illegible]	[illegible]	17	12	8½	6
7	101	[illegible]	69	[illegible]	51	[illegible]	[illegible]	27	[illegible]	[illegible]	15	12½		[illegible]
7¼	[illegible]	[illegible]	73	[illegible]	[illegible]	41	[illegible]	29	27	22	20	[illegible]	10	6½
7½	117	[illegible]	78	[illegible]	[illegible]	[illegible]	42	[illegible]	29	24	21	14½	10½	[illegible]
7¾	121	90	83	71	62	[illegible]	45	[illegible]	31	[illegible]	22	15½	11	7½
8	132	96	88	76	68	[illegible]	48	[illegible]	32	28	24	16	13	[illegible]
8¼	141	100	[illegible]	80	71	[illegible]	51	[illegible]	35	[illegible]	25	17½	[illegible]	8½
8½	150	104	100	81	76	[illegible]	[illegible]	40	38	30	27	19	[illegible]	[illegible]
8¾	156	111	101	89	[illegible]	[illegible]	57	42	39	32	29	20	11	10
9	168	120	112	96	84	67	61	45	42	34	31	21	15	10½
9¼	180	127	116	101	90	71	65	47	45	35	32	22	16	11
9½	190	133	125	107	95	[illegible]	68	50	47	37	34	21	17	[illegible]
9¾	197	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	72	[illegible]	50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	205	148	140	120	104	[illegible]	75	55	[illegible]	42	38	26	[illegible]	[illegible]

If sharp focus is secured on any of the distances shown, then, with the stop indicated, all objects are in focus from half the distance focussed on up to infinity